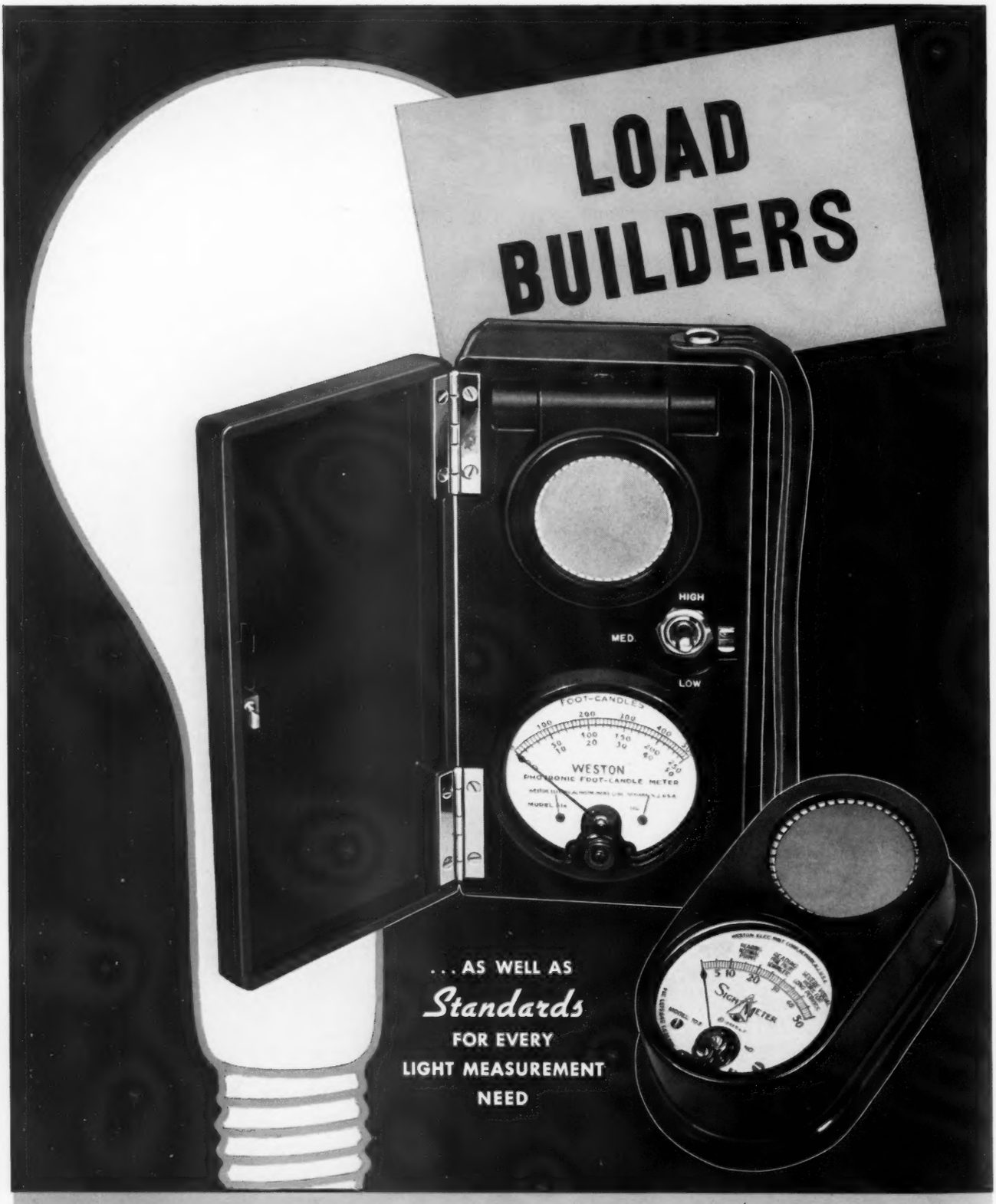
Electrical World

JULY 29, 1939

"Lighting for Revenue"



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Price Alone Won't Bring Adequate Wiring

The past decade has demonstrated how essential increased residential and commercial consumption is to sustained return on investment. Can this usage continue to grow indefinitely? Certainly there is no limit in sight so far as equipment to use more energy is concerned. But there is a very definite physical limitation—the customer's wiring.

To correct this situation the Edison Electric Institute has proposed certain changes in the National Electrical Code. These proposals had their first hearing before the article committees of the N.F.P.A. electrical committee last spring. The final consideration before the 1940 code appears will take place at the meeting of the entire committee in December.

There is a certain amount of opposition to these proposals based upon a misunderstanding of resulting commercial implications. There is no question but what the utilities are seeking wiring methods that result in lower costs of installation. They admit it. But here is the point that has not generally been understood. The markets that the utilities are primarily interested in are not markets that are now, or ever have been, active. Their main objective is to rewire residences and commercial buildings.

If the proposals of E.E.I.—covered neutral for residences and bare neutral, low-diameter conductor insulation and greater conduit fill for commercial buildings—will result in the rewiring of these two classes of buildings the benefits will not be one-sided. Almost everybody in the electrical business—labor, contractors, dealers, manufacturers—will benefit.

The Edison Electric Institute, through its wiring committee, has just released the first of three bulletins on this subject. The basic factors of adequate wiring are well presented. The story should be studied carefully by every utility sales department.

To recognize these new methods in the code, however, is not enough, for, as we all know, lower price by itself, particularly where no previously recognized market price has been established, is insufficient to stimulate sales. Lower wiring costs will bring increased rewiring sales no quicker than lower rates, of themselves, will increase consumption. This new E.E.I. bulletin takes full cognizance of this fact.

The new commercial wiring methods, particularly, answer a real need, for this marekt under conditions which necessitated a major operation on the building was almost non-existent. Even so, some one must sell the owners on rewiring with the less costly methods.

Are the utilities ready to commit themselves to a long-term campaign to develop this market if they get the code recognition of the desired materials? We feel that they are, or else why make such an effort to get the necessary code changes.

There has never been any question in the minds of any one but what the utilities could sell almost any kind of a program that they were truly sold on. Perhaps they might be able to do a lot for their cause if they were to make at this time commitments to engage in such a promotional and sales program.

FLUORESCENT LAMPS

GEORGE J. TAYLOR, *Lighting Engineer, General Electric Vapor Lamp Company*

High illumination level with fluorescent lamps
The windowless plant of the Simonds Saw & Steel Company is lighted by some 1,500 Cooper-Hewitt fluorescent lamps. Since they produce considerably less total heat per foot-candle than concentrated light sources, the heat effect is only about one-fourth that created with the same level of illumination with incandescent filament lamps.

DEVELOPMENT of more efficient light sources in the past has been shown eventually to lead not to a decrease in lighting loads, but to an increase in lighting standards. On the other hand, it is not so generally known to what extent greater efficiencies in light sources may affect the development of kindred industries. The recent development of fluorescent lamps will not only stimulate the trend to standards of general industrial illumination levels of 50 ft.-candles or more, but it will also aid considerably in bringing the attention of industry to the advantages of air conditioning by making it more economical than ever to install and operate.

The fundamental variance between air conditioning and engineered lighting was formerly a real stumbling block in the way of both. The lighting system produces heat, the air-conditioning system removes it. In other words, the better the lighting, the more expensive the air conditioning. An impasse resulted in many industrial areas for sales engineers, depending on whether the lighting engineer or the air-conditioning engineer got there first. For if an "engineered" lighting system was installed first, then air conditioning seemed too expensive, and vice versa.

Today it's a different story. The highly efficient fluorescent lamps will help the air-conditioning engineer in both old and new areas where air conditioning is being considered; they will help the lighting engineer in air-conditioned areas where the lighting is inadequate for the seeing tasks involved.

Modern standards for good seeing in industrial plants call for certain levels of illumination for various seeing tasks. Thus, an "engineered" lighting installation means to the lighting engineer one in which the wattage per sq.ft. is determined not by guesswork, or the average prevailing in industry, but by the predetermined level of illumination required. When this required level is provided by Cooper-Hewitt fluorescent lamps, although the heat from the lighting is as usual a considerable factor in the refrigeration load, yet it is only about one-third what it would be with a conventional system using incandescent filament lamps.

The air-conditioning system can thus be designed for lower capacity, at more economical operation. It must be remembered, of course, that any air-conditioning system should be designed with an allowance for possible increased future lighting load, but this requirement applies regardless of the type of lighting system used. Industrial areas can benefit under these circumstances from what might have been a hitherto overly expensive air-conditioning installation, at the same time receiving full benefits from high quality lighting.

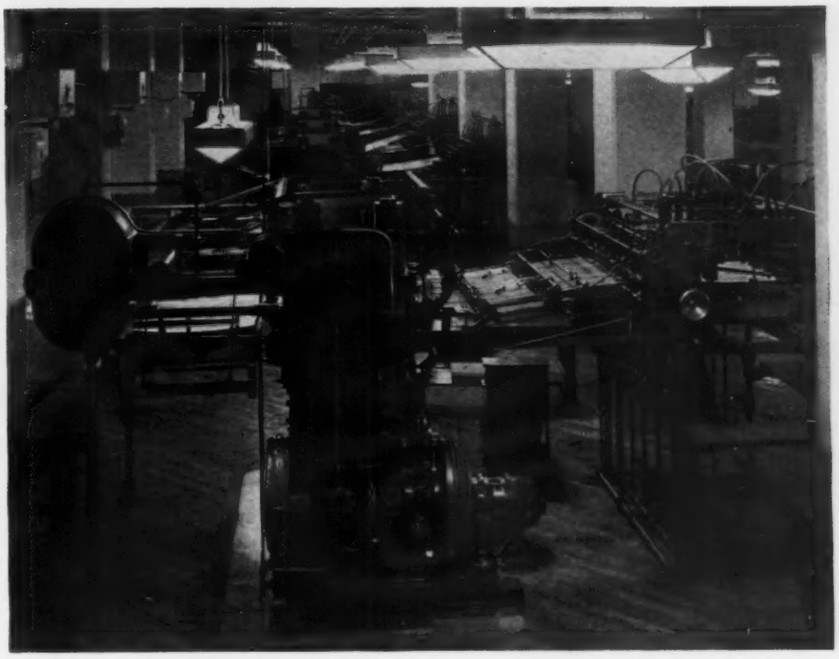
Many of the new large industries are establishing a marked trend toward windowless plants because of

AID AIR CONDITIONING

Heretofore, because of the heat factor, lighting has acted as a brake on air conditioning, or vice versa — With recently developed light sources it is now possible to secure the high levels of illumination specified by modern standards at reasonable costs for air conditioning.

the lowered construction and operating costs. Among the most important cost considerations in the windowless plant is the fact that reduction in heating costs in the winter offsets the additional cost in summer months of both air conditioning and lighting.

One of the executives of the Hershey Chocolate Corporation, for example, has said that their experience in the Hershey windowless plant has proved so satisfactory that they will probably never again build a production building with windows. Four years ago the Hershey company moved into its first windowless building, which comprises executive and general offices and a large privately owned printing plant. Hershey was convinced, as a result of careful studies, that windowless, sound-proof, air-conditioned buildings, with properly "engineered" lighting, were in over-all cost close enough to known costs of conventional type buildings to justify the construction of a windowless plant.



Windowless printing plant

Built by the Hershey Chocolate Corporation as a result of careful studies which convinced the company that windowless, soundproof, air-conditioned buildings, with properly "engineered" lighting, would pay their way in reduction of over-all costs.

Four years of experience has further confirmed their convictions that ideal, controlled working conditions pay not alone in greater productive efficiency and improved employee welfare but also in reduction of overall costs. In the interim a gradual program has been going on for rebuilding of all Hershey productive areas. The program is about 25 per cent complete, and at some future date it is probable that all air-condi-

[*Continued on page 122*]

In a hosiery mill

View in a plant of the Dexdale Hosiery Mills. In the new plants to be built in the South by Dexdale air-conditioning systems will be economically maintained with the aid of 100-watt fluorescent lamps.

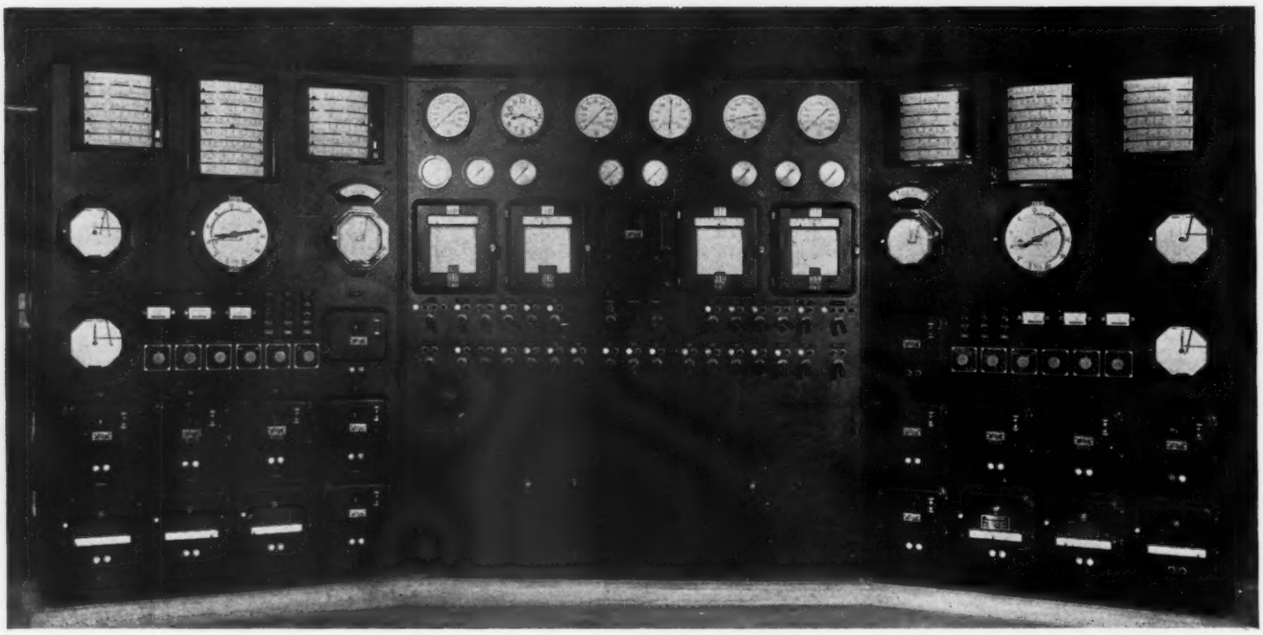
Fluorescent lamps help product control

Powdered metal department of Carboloy Company, Detro where close control of temperature and humidity is require Air-conditioning costs have been appreciably reduced, wh retaining a high level of illumination of 40 to 50 ft.-candl through use of 100-watt fluorescent lamps.

Best Efficiency at Lowest Cost Aim of Perry K Boiler Control

Control for new 670-pound, 765-degree boilers at Indianapolis plant is simple, sturdy yet flexible — System combines pneumatic and electrical control features

T. W. AYTON, ***Planning Engineer, Indianapolis Power & Light Company, Indianapolis, Ind.***



Factory assembly of firing floor control panels for high-pressure boilers eliminates expense of assembly and installation on the job

Central panel contains master controller for Metermax combustion control and gauges for steam, air and water. Individual panels for each boiler are on left or right. These contain Metermax combustion controllers, Micromax CO_2 recorder-controller, Micromax temperature controllers for mill air and preheater bypass. Republic Flow recorders, Consolidated Ashcraft pressure and draft gauges.

TO ATTAIN maximum efficiency at the lowest operating cost from new boiler equipment recently installed at C. C. Perry K station, Indianapolis, to provide additional capacity for generating electricity, commercial and domestic steam, it was essential that boiler control apparatus be reliable, simple and sturdy, yet flexible enough to give consistently good performance. These aims have been attained in the system selected, which combines automatic controllers that are loaded and actuated pneumatically with control action which is carried out electrically.

Additions to Perry K plant include two new 670-lb., 765 deg. boilers supplying a new 12,500-kw. nine-stage topping turbine and a 5,000-kw. fifteen-stage house turbo-generator.

The topping turbine exhausts into the 250-lb. steam header, from which steam may be used to operate low-pressure condensing turbines in this plant, or in a second plant (Perry W), located ½ mile away. This steam may be used in the Perry W plant to operate the condensing or the non-condensing turbines, which in turn exhaust into the low-pressure steam-heating mains, thereby generating useful electrical energy while reducing the steam to the desired pressure. The exhaust steam from the topping unit may also be used to supply or augment the high-pressure industrial steam in our 250-lb. distribution mains. Steam from the two new 670-lb. boilers may also be put through a pressure-reducing and desuperheating station, and then fed directly into the 250-lb. header.

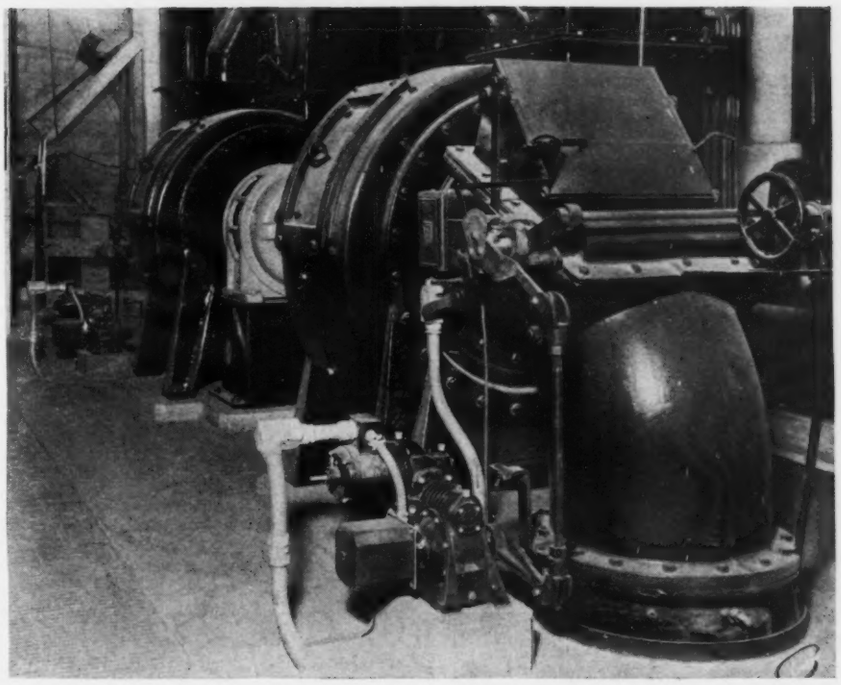
Each of the new Foster-Wheeler boilers has a maximum four-hour output capacity of 350,000 lb. of steam per hour and continuous output rating of 300,000 lb. of steam per hour. Each is fired with pulverized coal by two "Tricone" pulverizers, with the coal output from each mill regulated by a damper at the mill exhauster inlet. A damper in the primary air duct provides a ready means of maintaining a constant pressure at the mill inlet, while a damper in the hot air duct permits regulation of the temperature of the coal-air mixture leaving the mill.

Induced draft is provided each boiler by a turbine-driven fan, with speed regulation through adjustment of the turbine valve gear. Forced draft is supplied by a constant-speed motor-driven fan of the inlet vane type. A by-pass damper around the

preheater permits regulation of the outlet gas temperature at low loads, required to prevent condensation and corrosion of the preheater elements. Similarly, superheat temperature can be regulated by a damper in the superheater by-pass, and a boiler that has been taken out of service can be shut off from the stack by means of a stack damper.

In order to secure the utmost in efficiency at the lowest operating cost from our new boiler equipment it was necessary next to consider carefully instrumentation and control features. Guiding us in our selection, we had the experience with different types of instruments and with two types of combustion control at our Harding Street plant, as well as similar experience with our older equipment at the C. C. Perry plant and other plants. To supplement this background, a review was made of recent central station installations. Uppermost in our minds was a desire to find simple, sturdy apparatus which would be reliable and, in the case of the automatic controls, would be flexible and not too expensive to install, yet capable of giving consistently good performance.

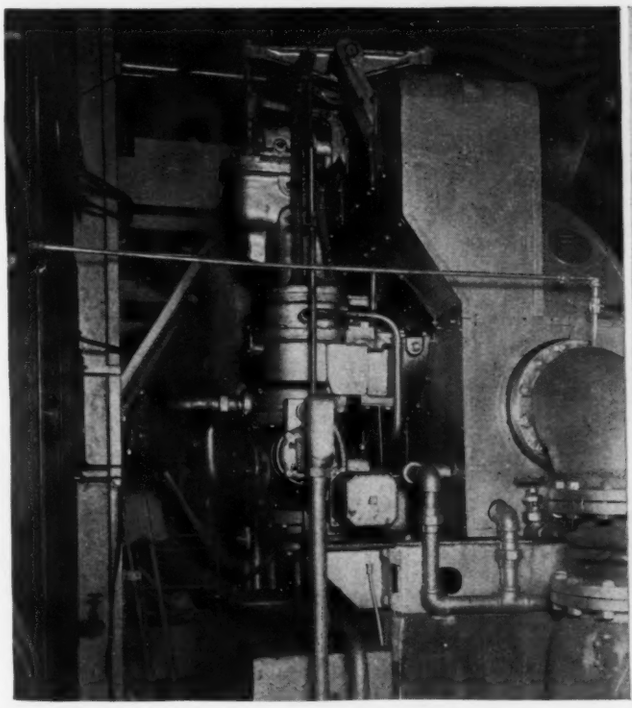
As a result, we selected a simplified form of one of the control systems we had used at Harding Street —"Metermax" conbustion control.



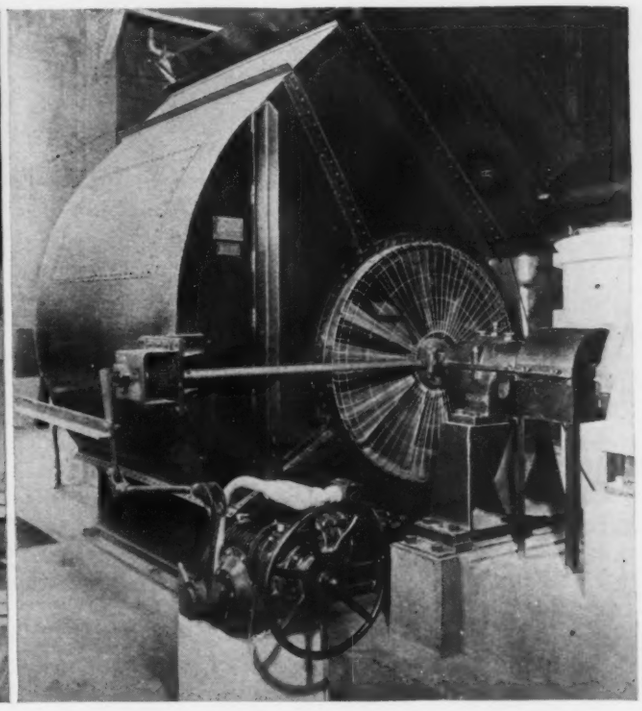
Air flow controller regulates mill exhauster damper to maintain relationship between air-loading pressure and coal output as measured by draft drop across the pulverizer

In this system automatic controllers are loaded and actuated *pneumatically*, while control action is carried out *electrically*. Each individual controller is a null-type mechanical balance, which operates to maintain a definite relation between demand and a measured force representing supply, by actuating an electric drive unit regulating that supply. Whenever supply is not in accordance with demand, the control action persists until it is brought to the desired value.

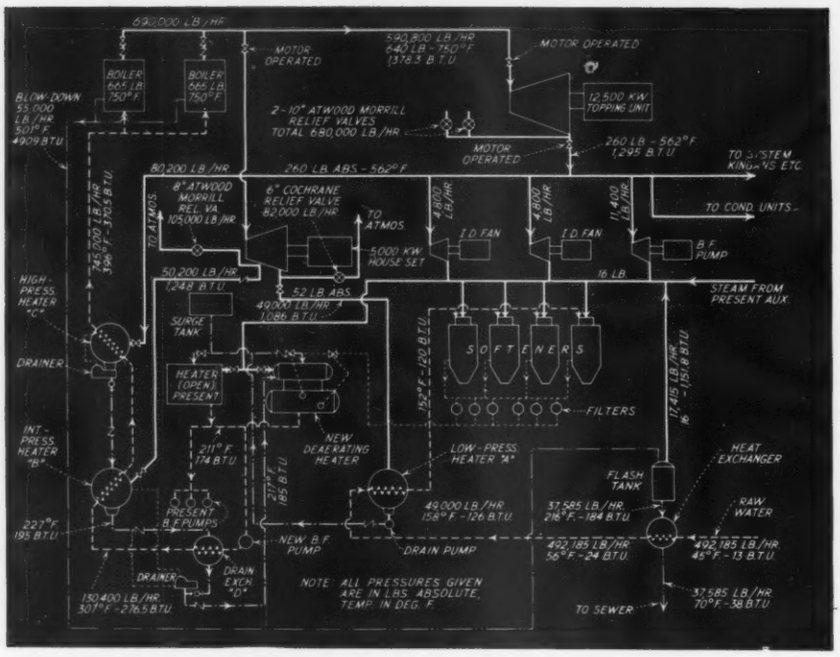
In this installation the master controller connected to the main steam header establishes an air-loading pressure for the two boilers in ac-



Metermax air flow controller acts on the control valve gear of this induced-draft fan turbine to maintain definite relationship between draft drop across boiler section and air-loading pressure



Furnace pressure controller, operating in conjunction with draft control, acts through this drive unit to regulate forced-draft fan vanes automatically and maintain furnace suction



Flow diagram C. C. Perry plant, section K

cordance with changes in steam demand as measured by header pressure. At each boiler the draft drop across a section of the boiler is held in definite relation to the air-loading pressure by an air-flow controller acting on the control valve gear of the induced-draft fan turbine. Acting in conjunction with this draft control, a furnace pressure controller acts on the forced-draft fan inlet vanes as required to maintain furnace suction at a predetermined constant value At each pulverizer a mill air-flow controller regulates the mill exhauster damper to maintain a definite relation between air-loading pressure and coal output, as measured by the draft drop across the pulverizer. A mill pressure controller at each pulverizer maintains pressure at the mill inlet at a predetermined constant value by acting on the primary-air damper. The superheater by-pass and the stack dampers are motorized and regulated from push-button stations at the control panel shown.

We purchased this control equipment from the manufacturer with the controllers and panel accessories all mounted, connected and wired on the panels as shown in the accompanying illustration. This not only reduced the time and expense of our engineering department in laying out the equipment but also the time and labor of making the actual installation. Furthermore, with the apparatus centralized in a convenient location, it is easy to operate and easy to maintain. All parts are readily accessible for inspection, a factor which we have found to be important for any apparatus if good maintenance and consequent continuity of operation is to result.

In every central station abnormal conditions sometimes arise which can be handled most efficiently by a type of control other than full automatic. In such event, either or both boilers can be transferred to base-load control, with automatic fuel-air ratio and furnace pressure, or to push-button control. To effect such a transfer —from full automatic to push-button control, for example—the operator simply turns a selector on the control panel switch without having to balance any pressures. This is a feature which appeals not only to us but to our operators as well.

We also have protective interlocks, which, in the event of air-supply failure, cause all controlled elements to remain stationary—all control quantities remaining at existing rating. Further, the draft is so interlocked with the fuel as to limit it to the capacity of the fuel-burning equipment in service, thereby preventing smoking and even dangerous conditions at extremes of rating.

Automatic CO_2 Compensation

A basic check on the efficiency of combustion is, of course, the CO_2 in the flue gases. We accordingly installed a "Micromax" CO_2 recorder of the new saturated-gas type. This instrument operates on the thermal conductivity principle of measurement, comparing the heat conductivity of the flue-gas sample containing CO_2 with that of a standard gas and recording the result on a null-type electrical recorder in terms of CO_2. Contrary to earlier types of CO_2 instruments with which we were familiar, this instrument saturates the gas sample with water instead of drying it, and thereby eliminates driers with their attendant maintenance. The equipment, as indicated, is all electric, employs no chemicals and may be plugged in directly to a 115-volt, 60-cycle supply.

With the instrument available for indicating and recording CO_2, it was a simple matter to add control disks to it so as to actuate the fuel-air ratio control on the combustion control. Thus, we have an additional automatic adjustment of fuel-air ratio to take care of variations in the B.t.u. value, moisture content, etc., of the fuel.

Automatic Temperature Control

Better performance of the mills is obtained by maintaining a uniform temperature of the coal-air mixture. Accordingly, a balance-type Micromax temperature controller is installed on each mill to regulate the mill tempering-air damper, as is required to maintain a uniform temperature of the air-coal stream leaving the pulverizer. This temperature is detected by a thermocouple at each mill.

Protection of our preheater against corrosion is obtained by a similar Micromax indicating controller operating the preheater by-pass damper to maintain preheater outlet gas temperature above the dew point of sulphuric acid.

Temperature Recorders

To indicate and record vital temperatures, three eight-point Micromax recorders are provided. These recorders keep before the operator's eyes the temperatures of the important variables and aid in maintaining maximum operating efficiency.

Each of the two boilers is equipped with a Micromax instrument, which records temperatures of air to preheater, air from preheater, flue gas from preheater, flue gas from boiler, air-coal mixer from pulverizers, feed-

[*Continued on page 127*]

Maintaining Dealers' Sales Pace as Saturation Rises

Idaho Power creates new markets, uncovers new prospects by essay contest, sees wide field for dealer sales — Company salesmen make 1,200 calls per year

R. E. GALE. ***Commercial Manager Idaho Power Company, Boise, Idaho***

LAST SPRING Idaho Power Company's sales executives were wondering how to locate new markets for electric ranges. Faced with an electric range saturation of 50 per cent, they were concerned about getting results that would compare favorably with the record of 10.07 per cent of domestic customers sold in 1936 and 9.79 per cent sold in 1937.

Of course there was a replacement market to be tapped. If the average life of an electric range is twelve years, more than 4 per cent of Idaho Power Company's customers must be sold ranges each year if the saturation is to be maintained. At the beginning of 1938 there were 48,000 domestic customers, providing a replacement market of about 2,000 electric ranges.

New customers were being added at a rapid pace, so it was estimated that the sale of 2,100 electric ranges during 1938 would merely take care of the replacement market and keep the saturation on an even level.

What else could we do to sell people who had previously been unable to buy? Unquestionably it would require the best promotional efforts of the whole industry in this area to continue the pace that had been set in 1936 and 1937. Manufacturers, jobbers, dealers and ourselves were resolved to find new customers for electric ranges by intensive, co-ordinated sales promotion and advertising.

We had realized many advantages in past years by getting an early start for range sales activities. The spring campaign began February 21, and for the first effort we planned a nine-week activity. One hundred range sales per week was the goal, a total of 900 units.

R. E. Gale
Commercial manager Idaho Power Co.

Simultaneously we launched, under the sponsorship of the Electrical Equipment Sales Association, an essay contest built around the topic "Why I Would Like A New Electric Range." Manufacturers and jobbers provided eleven electric ranges to be used as prizes in the contest, and there was a grand prize of a $1,000 electric kitchen in addition to numerous lesser prizes.

Prospects Total 65 Per Cent

Nearly 15,000 entries were received, the entry blanks having been furnished through dealers' stores. We are still amazed at one of the results —65 per cent of the entries came from people who were not using electricity for cooking. Apparently our contest had reached the people who constituted our best market for electric ranges. And the campaign quota was exceeded by 45 units without using a free wiring plan or blanket trade-in offer.

Dealers secured live prospects as the contest progressed. The entry blanks were so arranged that the name of the entrant and the cooking method used, together with the age of the range, were left with the dealer.

Extensive advertising accompanied the campaign. Newspapers, radio, poster boards and direct mail were used by the Electrical Equipment Sales Association, by our company and by dealers. Special attention was given to window displays, with the result that the entire electric appliance industry of southern Idaho and eastern Oregon presented a co-ordinated sales story to the public.

The interest in new electric cookery stimulated by the spring range campaign and contest was productive of sales results during the balance of the year. Final results for 1938 showed that Idaho Power Company and dealers had sold 4,475 ranges, representing sales to 9.24 per cent of Idaho Power Company's domestic customers.

Over a period of years dealer coordination has been a matter of pioneering with Idaho Power Company. Pioneering has meant introduction of new appliances, advertising them, increasing saturations and building markets which today are the basis for sales by all dealers. Electric clothes washers were first among domestic appliances to be pioneered. In 1926 Idaho Power Company sold 984 units. During 1938 the company sold 556 units, but other dealers sold

This all-electric kitchen was awarded as first prize in an essay contest which helped sell ranges in 1938.

Sixty-five per cent of the entrants did not use electric cookery. One out of every eleven Idaho Power domestic customers bought an electric range last year.

3,085 units, or 84 per cent of the total.

Electric refrigerators have followed a similar course. In 1926 Idaho Power Company sold 96 units. By 1930 company sales had increased to 977 units, but a market had been created, and other dealers sold 95 units in that year. In 1938 company sales were 585 refrigerators, but sales by other dealers had been increased to 3,520 units, or 85 per cent of the total. Here again company pioneering, salesmanship and advertising have resulted in building customer acceptance, with resultant increase in sales volume for all sales allies.

It is notable that company sales promotion of electric washers and refrigerators has now become lessened, while attention is being given to pioneering newer appliances. The objectives of the broad program—the creation of markets for sales allies—have been accomplished.

Electric Range Mid-way

The electric range is in a mid-stage of pioneering in this territory. In 1926 Idaho Power company sold 1,335 units. By 1930 a mass market had been created and the company sold 3,379 units, while other dealers sold 358 units, or 10 per cent of the total. In 1938 company sales amounted to 1,748 units, but sales allies during the same period sold 2,727 electric ranges, or 61 per cent.

The electric water heater is the newest major domestic appliance to which the pioneering procedure has been applied. Sale of manufacturers' complete "package units" began in 1932, when Idaho Power Company sold 824 water heaters. Business depression came in 1933, when sales dropped to 356 units, but pioneering continued. In 1936 other dealers entered the field and sold 12 per cent of the total. During 1938 Idaho Power Company sold only 1,484 water heaters and other dealers handled 619, or 29 per cent. The total of 2,103 units represent sales to 4.34 per cent of our domestic customers.

Undoubtedly the same trend will be effected with water heating as has been shown with other appliances, and total sales and dealer sales will continue to increase as the market develops.

Much of the effectiveness of the pioneering program has been the result of training Idaho Power Company salesmen to sell "use" of equipment rather than the competitive product. In fact, company salesmen's commissions are paid on both company and dealer sales of electric ranges and water heaters providing a bona fide sales call has been made on the customer by the salesman within 30 days of the date of sale.

Our best salesmen call on about 1,200 persons per year—a total of about 2,200 sales calls, including follow-ups. The same "best" salesmen sell about 150 major units per year. That leaves 1,050 unsold customers in each salesman's territory—customers who have heard a complete story on the benefits of appliance use and who are usually the best prospects for other dealers. This is a major part of the company's contribution to sales by the industry in the territory it serves.

Improving conditions for sales allies is a problem that includes coordination of promotion, sales training for dealer salespeople, assistance by supervisors and local managers, home service effort, kitchen planning service, wiring plan service, advertising and promotion of appliances not handled by the company.

Wide Field for Dealer Help

Dealer sales training is facilitated by use of a dealer rate handbook, which enables dealer salespeople to become fully acquainted with electric rates and use their knowledge as a sales tool. The company has also issued a book entitled "How to Sell an Electric Range," which can be applied to dealer selling of all appliances and used as a basis for sales training. Manufacturers and jobbers have an important responsibility for sales training of dealers, and this work should be encourged.

In August, 1937, we started designing kitchen and wiring layouts for dealers and customers at a nominal charge per plan. They include specifications and explanations to justify our ideas of size, number of appliances and outlets, location, and so forth. Experience to date shows that 82 per cent of the plans issued have been used in homes. The number of new appliances installed in kitchens where our plans were used shows an average of 1.75 per plan.

Customers have been found willing to use our ideas on adequate wiring. Sixty-six per cent of the wiring plans submitted have been accepted, and we feel that this number can be increased by more thorough promotion with dealers and wiring contractors.

There is unquestionably a great field for service for our utility representative to assist dealers with better business practices. Sometimes too

[*Continued on page 127*]

High Service Quality Demanded and Given

With a program on the air, broadcasting station cannot tolerate service interruption — Two lines from different sources with combination of automatic and manual control assure continuous supply

L. F. HUNT, *Protection Engineer*,
J. H. VIVIAN, *Superintendent of Relays*, *Southern California Edison Company, Ltd.*

SERVICE RELIABILITY almost absolute in quality was demanded for the 50,000-watt broadcasting station, KNX, built last summer near Redondo in southern California by the Columbia Broadcasting Company. To supply such service a new consumer type automatic substation was designed to serve the load from the system of the Southern California Edison Company.

For the present 300-kva. bank of transformers at KNX (ultimate 1,500 kva.) two 16-kv. lines are used, each from a different station. One, known as the preferred line, is normally used. The other, energized at the source, but open at KNX, is known as the emergency line. During abnormal operating conditions, and possibly for regular operation later, it may be necessary to parallel the two lines.

A flexible control and relay system has been provided which will permit operation of the station on either preferred or emergency service or on loop service. This change in service may be selected by means of a six-pole, double-throw knife switch located on the relay board.

The station is not entirely automatic because the operating engineers of KNX requested that they be given certain control of the feeder circuits. They felt that, if service was automatically changed from preferred to emergency during a program, they would rather restore preferred service at their convenience. The relay timing is such that the two feeders are paralleled for three cycles during this transition.

A feature of the design is that by use of a set of 16-kv. bypass disconnects and secondary control switches (and knife switches) all equipment may be tested without impairing service. All relays may be tested without the necessity for disconnecting switchboard wiring.

Two 6-kv./110-volt potential transformers are connected in open delta on each line. These transformers will, of course, be energized when their respective lines are energized. A type CP three-phase voltage relay having front and back contacts is connected to each set of potential transformers. Three-phase relays are used to prevent reclosing when one phase is open circuited or should the feeders become cross-phased. The front contacts are connected in a 32-volt d.c. circuit to close the corresponding line breaker and the back

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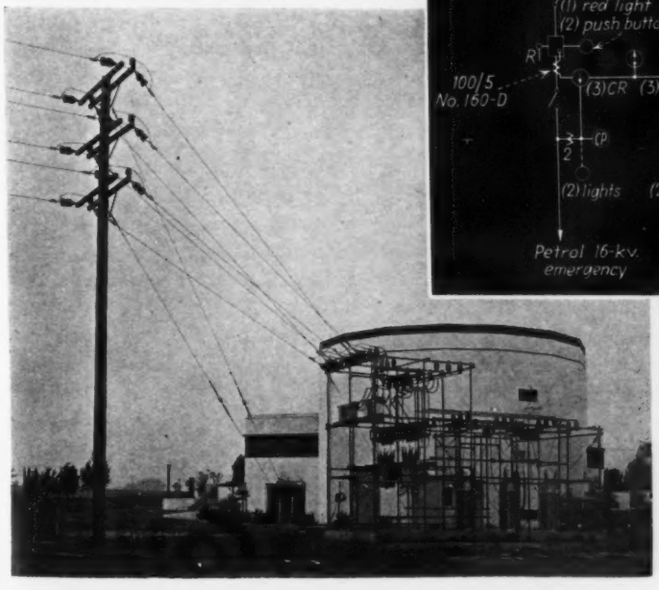
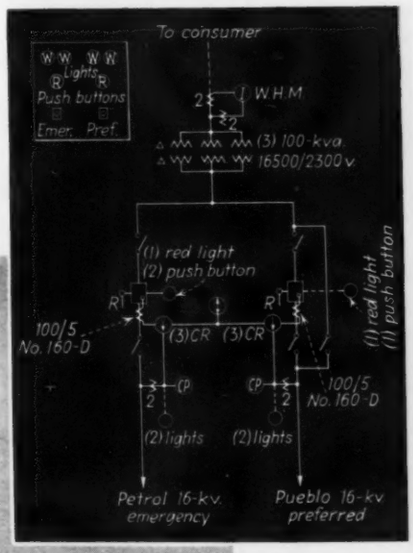
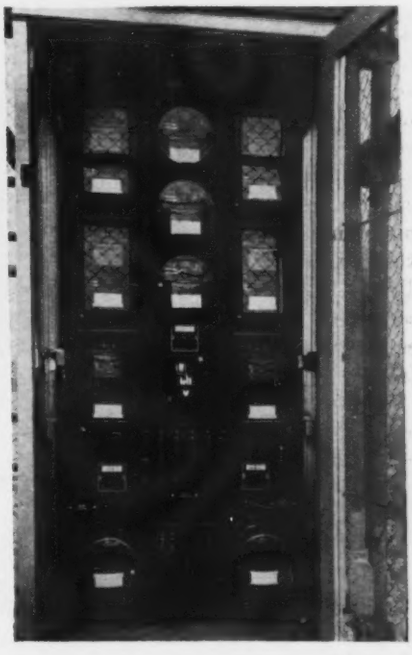


Substation for service to KNX



Energy supply diagram



Relay and control assembly

The six-pole knife switch is for manual change from one line to the other

Procedure of Change from Delta to Wye Distribution

Step-by-step sequence of operations for changing distribution primary from 2,300-volt delta to 4,000-volt wye reduces service outages to minimum — Work can be done in normal working hours

J. H. BAILEY, JR., *Kentucky Utilities Company, Danville, Ky.*

PROVIDING adequate facilities for rapidly increasing loads is the major problem of the distribution engineer of today. Even in towns of a few thousand population a comparison of the present loads with the loads of a few years ago warns us that it is imperative to provide a system that will not only supply our present demands but allow for increases in the future.

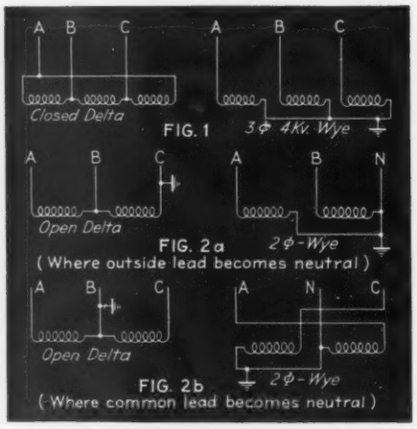
To provide for these loads on the secondary circuits the practical solution is to increase transformer capacity and increase copper sizes, in some cases supplying heavily loaded areas from a 120-208 network system. On the primary circuit the 2,300-volt delta system offers a simpler solution. Converting the 2,300-volt delta system to a 4,000-volt wye system with a common neutral provides triple primary capacity at a comparatively small cost. Other advantages, such as having a low resistance ground for the secondary circuit and providing a better ground for lightning arresters, need not be enlarged upon.

Assuming that the advantages of a 4,000-volt wye system over a heavily loaded delta system are satisfactorily remunerative, next comes the problem of actually carrying out the conversion. With increased loads and a widely diversified use of electric energy has come the importance of maintaining continuity of service and keeping interruptions to a minimum. To meet this situation, here is described a method which has been employed several times most satisfactorily.

The first step is to establish the multi-ground neutral. This is accomplished by stringing a secondary conductor from the substation and linking it with the secondary neutral of all transformers comprising the main portion of the distribution system. On long single-phase extensions or rural lines one of the present conductors is usually used as a neutral.

All secondary neutrals that are deemed too small are increased in size and the neutral is connected to all areas by as many paths as are practicable, being tied together at every possible junction.

The neutral being established and all grounds connected to it, the next



Transformer connections for maintaining proper phase rotation

step is to ground one phase of the 2,300-volt delta system to the grounded neutral. Before doing this it is of course absolutely necessary that all phase wires be clear of grounds. Tests should be made and any phase wire that indicates a ground should be cleared at this time (even though this is the phase to be temporarily grounded), since it must be cleared before the primary can be operated on the wye system. In grounding the phase wire of the delta care should be exercised that a ground is not placed on both the line and load side of a regulator. However, the best way to avoid this complication is to ground the phase wire that does not pass through the series coil of a regulator (assuming only two regulators to be on the delta circuit).

This conductor being grounded, it is now safe to connect one side of the primary of all single-phase transformer installations and single-phase primary taps to the multi-grounded conductor, allowing three-phase banks to operate as usual for the time being. Interruptions of very short duration are necessary on those transformers that are connected to the two ungrounded phases. No interruption is necessary on transformers that have one side of the primary connected to the grounded conductor, though this connection must be changed to the multi-grounded conductor. While changing these connections one arrester and one cutout may be removed, preparing all installations for operation on the 4-kv. circuit.

It should be remembered that all single-phase loads will be operating from two phases by such a procedure. This produces an unbalanced load on the transformers in the substation and they will not share the load equally. It has been found that the transformer across which no load is directly connected will carry about two-thirds as much load as each of the two others. If the load is as nearly as possible balanced between the two phases the unbalance of load on the transformers is not a serious problem and need not cause concern unless the substation is already overloaded.

With the system now operating with all single-phase load from two-phase wires to neutral, it is readily adaptable to the wye system by interrupting service only long enough to change connections at the substation. Of course three-phase banks must be interrupted long enough to change

[*Continued on page 123*]

Direct Stroke Proves Length of Lightning Tail

A 20,000-amp. (crest) stroke found to endure for 20,000 microseconds—New device (Fulchronograph) records complete duration from crest—Undamaged distribution arrester passes normal test after sustained discharge

C. F. WAGNER, ***Consulting Transmission Engineer,*** **and EDWARD BECK,** ***Lightning-Arrester Engineer***
Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

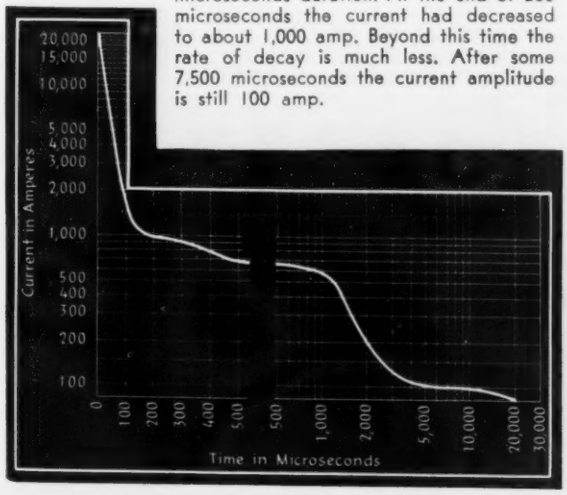
MEASUREMENT of lightning stroke currents throughout their entire duration, showing both the high and the low amplitude components, has been made practical by the development of a new surge-recording device. A stroke recently trapped and measured left concrete evidence of characteristics present in lightning-produced surges that warrant an intensified revival of natural lightning studies and surveys. The direct stroke first recorded with the new equipment showed 21,000-amp. crest and a total duration of 18,000 microseconds. The entire surge passed through a 3,000-volt distribution lightning arrester of recent design. The arrester met this extraordinarily severe test without loss of its ability to meet its protective requirements.

Most of the available information about lightning has been obtained with the surge crest ammeter and the cathode-ray oscillograph. The former gives record of crest magnitude and the latter data on rate of rise and general shape of the high amplitude components. Cathode-ray oscillograms obtained, however, have appeared to be of short duration—up to a few hundred microseconds. Field experience with electrical apparatus on transmission and distribution lines has, however, led several investigators to suspect that a lightning stroke has a relatively long-lasting component, perhaps of low current magnitude, that has great bearing on the ability of some classes of equipment to withstand the surges from direct strokes.

The principal handicap to obtaining the requisite large number of records of the complete life of lightning strokes was the absence of a simple, inexpensive recording device that could be placed in large numbers over a wide geography. The Westinghouse company, therefore, produced a new type of surge recorder known as the fulchronograph, which can record natural lightning currents in their entirety automatically and without attendance.

Direct stroke recorded with 0.02 second duration

It consisted of a single discharge of negative polarity with an initial high amplitude component of 21,000 amp. crest, followed by low amplitude component of more than 18,000 microseconds duration. At the end of 200 microseconds the current had decreased to about 1,000 amp. Beyond this time the rate of decay is much less. After some 7,500 microseconds the current amplitude is still 100 amp.



With the fulchronograph as the basic tool a series of 23 field study stations have been installed in the region from Pittsburgh to the Gulf. At these are located 50 fulchronographs. At some of these stations automatic cathode-ray oscillographs are also installed, to provide information on the surge wave fronts and crests. One of these stations is located on the roof of the 42-story 500-ft. Cathedral of Learning of the University of Pittsburgh. It was at this station that the direct stroke shown here was recorded.

Lightning laboratory on the roof of the University of Pittsburgh's Cathedral of Learning

Lighting mast on insulators and behind wood box containing arrester. The two fulchronographs at the right record the stroke intensity and duration. Each fulchronograph consists of a motor driven disk whose rim passes through a field created by the surge current. Fastened to the rim of the disk is a large number of flat magnets of special steel, each of which is magnetized to a degree proportional to the current in the surge at the time the magnet passes through the field. The fulchronograph is capable of recording with accuracy a range of current from 80 to 150,000 amps. The disk of one unit is driven at high speed to record a complete surge on a relatively extended time scale. The disk of the other is driven at slow speed so as to record multiple strokes. The wheels stop automatically after a surge.

At the laboratory on the Cathedral of Learning a 50-ft. steel mast, insulated from the roof, provides the

[*Continued on page 125*]

Planning for Consumer Satisfaction

Today's—and increasingly tomorrow's—concept of the business of electricity supply is that utilities sell electric service, not just electric energy—Problems of service quality and getting users to appreciate it offer many opportunities for new thinking

VINCENT THIEMANN, *Wisconsin Public Service Corporation, Green Bay, Wis.*

ONE would gather from the talk and notions of us in the electrical industry that we are in the business of selling electricity. Our customers, however, don't buy electricity—they want and purchase electric *service,* a vastly different thing. This disparity in viewpoint between the utilities and their clients is one reason we do not always have the good will and loyalty our efforts and efficiency deserve. Incidentally, it is also a justification for studies of system performance and reliability to make sure the customer gets what he feels he should have.

To the people we serve electricity means comfort, convenience, ease, luxury unknown to ancient kings—but what customer ever wanted a unit of energy? The real commodity we sell is the quality of service we render; it is not for nothing we are called "utilities." Too often we direct our actions to the amount of energy and the cost per kilowatt-hour when we should be inviting the customer's attention to the dependability, the freedom from interruptions and voltage fluctuations, to the fact that we are raising the standard of living in our communities. When we become involved in arguments about taxes or yardsticks or the other aspects of quantity, we are on the battleground chosen by our critics; the electric consumer is not as much interested in our reasoning, however correct and just it may be, as in our ability to satisfy his needs and desires.

We need an index of the reliability of electric service and a measure of voltage regulation; we shall have to find out what tolerances of service our customers want, and how to evaluate the various expedients and expenditures to maintain that quality of service.

We realize that if we could solve

the secret of the elements by releasing the tremendous energy in the atom it would not appreciably lower electric rates, since the cost of energy is such a small element in the cost of electrical service. All of the investment, with the greater part of the operating charges, exists solely for the purpose of maintaining the quality of service, for giving the maximum possible freedom from outages and variations from standard voltage. For want of a better basis, we compute the billing upon only the quantity of electricity; this tendency to over-simplify electric service has led to the subordination, or even neglect, of aspects concerning the quality. Because their importance has not been realized, remedies to improve service have often been misdirected; we cannot efficiently utilize our circuits and apparatus, nor plan additions intelligently, without knowing how successful our efforts are in keeping our service to the desired norm. Increased loads mean a greater dependence upon our lines and equipment so that it is becoming imperative to set up procedures for recording and methods of analyzing outages or failures in order to take care of the demand for greater reliability along with the increased loads.

Is Coulee a Mandarin?

Despite the politicians, the people aren't very interested in the cost of electricity or in the intricacies of electric systems or the great share taxes take, or the gigantic hydro-electric projects with a large part of their investment charged to subterfuges supposed to involve the public welfare. The average person may think the Grand Coulee is a Chinese executive and that Fort Peck makes a bushel; he doesn't know what your rates are, or if they're high or low—unless you start apologizing for your costs or complain about taxes, and then, of course, the average man begins to suspect that electricity is not cheap. That's true even if he had previously been contented with the tone and flavor of the service he received.

Houser[1] relates the case of a city with separate gas and electric utilities, where the electric rates were among the highest 25 per cent, while the gas rates were among the lowest 25 per cent, of all communities of the same size. The gas company was indifferent to individual consumer desires, but the electric corporation took unusual care to find and meet customer wants. A survey revealed the general public belief that the gas rates were exorbitant, while the electric charges were reasonable.

Quiz for Customer Wants

How can you discover if your service is satisfactory? You can't depend upon the nature and number of complaints, for dissatisfaction is often below the threshold at which it becomes articulate. Blake[2] points out that the complaints for low voltage were less than one-tenth of a per cent in two districts where almost one-third of the consumers had voltage below the limit of good service.

The only way to find out what your customers want is by asking them. The regulatory commission standards should be regarded merely as minimum requirements, not, however, to

[1] J. David Houser, "What People Want from Business," an excellent treatment of this subject which you'll find helpful and interesting.
[2] David K. Blake, "System Voltage Regulation," ELECTRICAL WORLD, August 3, 1935.

be maintained in conflict with desires of the consumers; on the other hand, it is highly presumptuous of us to assume that we have any occult power to determine our customers' predilections without consulting our real boss—John Q. Public. "The only practical method of handling an investigation of the industrial system today is to assume that people are entitled to want what they actually do want, and to define economic efficiency as giving people what they want. Anything else involves deciding (and ultimately trying to tell people) what they *ought* to want, which becomes tyranny pure and simple." [3]

You can undoubtedly recall instances in shopping when your resentment at being told what suited you kindled a resolve to carry your patronage to another shop, or if you have a pliant personality, I'll wager at least that your wife has more than once been vexed when a mauve dress appealed to her aesthetic sensibilities but the clerk urged the selection of a Dubonnet. Your customers, of course, can't get their electric service elsewhere, so their provocation at being slighted becomes transferred to ill will against the utility. I have no doubt that much of the agitation for lower rates can be traced to disregarded opinions or frustrated desires of certain individuals.

Let's Ask Customers

It is not suggested that we can find out what specific tolerances are desirable in voltage regulation or service continuity, but I believe we can discover whether or not our present service is generally satisfactory and how it can be improved. Perhaps you may not learn very much by listening to your customers, perhaps you might; the point, however, is that by asking their opinion you can increase their regard and esteem for you. Two benefits derive from this procedure; you get the actual information you want first hand, which is better than mere conjecture or belief; secondly, your public relations will be vastly improved if the people feel that you are sufficiently interested in them and their desires as to go to them for help. The company which sets itself the task of educating its customers has undertaken an impossibility; it is better to *let your customers teach you,* and not the least advantage is the cordial friendliness toward you this engenders. To listen to the folks you do business with, to cherish their views and desires, is a subtle compliment; their regard for the utility will increase in the same proportion as the esteem you show for their judgment. Successful business men realize that their clients want to feel important, that it pleases their ego to be consulted; even if it results in no change in service, the customers want to have their say.

[3] From the "Berle Memorandum" of the Suggestions to the Temporary National Economic Committee for the Investigation of Business Organization and Practices.

Benefits of Reliability Studies

To determine the quality of electric service has a far greater justification, however, than to place greater emphasis upon customer satisfaction. To record and analyze reliability and regulation is the only way to find means for improving the quality of your commodity or for reducing expenses without impairing that quality; growing loads require planning circuits and apparatus for their service characteristics as well as their capacity.

System planning requires facts, not guesswork. Freedom from outages and voltage fluctuations are large factors in construction standards, whether taken into account consciously or unconsciously, and specifications should be based on reason and intelligence rather than instinct or intuition. Too often the source of the loudest complaint gets the most attention, and unreasonable amounts are often spent on expedients to improve service which cannot give the desired results or which are not justified by the probability of occurrence of outages during load hours. The cost of establishing and continuing adequate records of regulation and continuity of service will be only a small part of the money which will be saved through their use in evaluating the quality of service and the efficacy of the various means to improve it.

Statistics of any sort, of course, are not an end in themselves, but only a means to an end. The usefulness of your records depends upon the use to which they are put. Voltage surveys should be made systematically and to cover the whole system, not only suspected locations. Simultaneous charts must be set at different points on a feeder so that the location and cause of voltage drop may be known; finally, and most important, deviations from the standard should be remedied.

Use Maps as Adjuncts

Interruptions to service or damage to lines or equipment also require close analysis. The most important way to use this information is to identify it by location, either on a map or in a card index. This will focus your attention on the places most susceptible to outages or failures so that you can eliminate the causes or mitigate their effect. Tying up interruptions to their locations also enables you to see if the ratings, installation and operation of the protective equipment are proper and adequate.

Outages and damage should also be summarized by cause and severity to provide an index of system reliability and to yield the facts for planning and construction specifications. This summation might show the relative performance of apparatus and circuits or if the factors of safety are correct; the relative seriousness or time of day and nature of the load affected would indicate whether or not you would be justified in improving the service, while from other data you could determine the value of various alternatives for raising the electric quality.

"Virtue is its own reward," but goodness of service carries a distinct monetary advantage. Improving subnormal voltages increases revenues,

[*Continued on page 128*]

Vincent Thiemann

Editorials

S. B. WILLIAMS, *Editor*

The Intrastate Myth

LITTLE BY LITTLE utilities that thought themselves purely intrastate in their operations are being brought within the jurisdiction of federal regulation. The latest case is the determination by the Federal Power Commission, in the case of Jersey Central Power & Light, that it has jurisdiction over utilities connected to transmission facilities that cross state lines.

Jersey Central operates wholly within the state of New Jersey. It has a connection with New Jersey Power & Light and also with Public Service Electric, which in turn is connected through a transmission line with Staten Island Edison in New York. The F.P.C. has ruled that these interconnections comprise part of an interstate exchange of energy and therefore the acquisition of Jersey Central common stock by New Jersey Power & Light comes within its jurisdiction.

Quite correctly F.P.C. has labeled this a "precedent-setting determination." It would seem to us, inasmuch as all kilowatt-hours coming over the border would tinge the color of all energy in the system, that any company tied into an interconnected system, other than for purely emergency purposes, comes, if this determination is not challenged, within F.P.C. jurisdiction.

Some companies have sought to escape F.P.C. regulation through complete isolation from power sources outside the state, but this is not always economically practical because of the necessity for otherwise making more generating investment. On the other hand, this decision will hardly encourage intrastate utilities to become a party to interconnections even for emergency purposes.

It isn't that utilities object to regulation; by this time they ought to be well accustomed to it. If this extra federal regulation provided some benefit to some one, perhaps they might not object, but where it is pure duplication, at an expense to the taxpayer and to the consumer, they do object.

Since this is the day of regulation, perhaps it might not be a bad idea to have a commission to regulate the federal regulatory agencies. It would cost something, of course, but it might save enough to pay for itself many times over by eliminating duplicated and unnecessary regulation of utilities.

Gas Turbine Progress

MORE THAN a dozen installations of gas turbines attest the continuous advances made in this type of power-generating unit. While still embryonic and uneconomical as a large source of power, its future is not without possibilities. It saves space, requires no boiler, condensing water or condenser, burns low-grade fuel and has a good theoretical efficiency.

A unit on order in Europe to develop 14,000 kw. with a 4,000-kw. generator gives an indication that the gas turbine is no longer a toy. Use of materials that permit temperatures of at least 1,000 deg. F. and the development of rotary type compressors are the two advances in the art that help along the gas turbine. A large part of the power of the turbine goes to compress the gas, while, of course, the high temperature of the exhaust gases lowers the efficiency. But by using two shafts, one with a compressor and one with a generator, and by using air heaters, gas turbine units of about 20 per cent thermal efficiency can now be had. Further developments may be expected, especially if higher temperatures can be used.

It may be that the gas turbine will soon come into wider use in this country as a supplementary power unit where waste gas or low-cost fuel may be utilized to advantage. At present it is confined largely to Houdry process oil-cracking installations and as an adjunct to high-pressure, forced-convection boilers such as the Velox.

More Duplication by Government

WHEN two people bump together in chasing the same hat it may amuse the onlooker, but when two great agencies of the government chase the same statistics the occasion calls for sober thought.

Every five years the Bureau of the Census makes a canvass of the electric utility industries. This has been going on since 1902. The census for 1937, of which the results have been announced in a series of bulletins during the past few months, presently to be published in book form, is therefore the eighth in a consecutive series.

One might imagine that these authoritative statistics, at fairly frequent intervals, would suffice not only for a record but also for establishing bench-marks to which such excellent intermediate surveys as that of the E.E.I. might be referred.

But now comes the massive statistical report of the Federal Power Commission, giving detailed data on 385 companies and a number of summary tables for the same year, 1937. These tables cover virtually the identical ground covered by similar tables in the census. We thus have not one but two sets of figures, both of them authoritative, both gotten out by federal agencies. Only, the figures are not alike. One group, the census, covers the entire industry; the other, the FPC report, covers by far the larger part, but not all.

This is not intended as a criticism of the work of the two agencies. Each performed a task within the field assigned to it by law. But it cannot be gainsaid that this work involved a lamentable amount of duplication of effort that has cost a lot of money for which we all have to pay: On the part of the government the preparation of mailing lists and questionnaires, the compiling and summarizing of thousands upon thousands of figures received in the returns, the publishing of the results; on the part of utilities the searching of records, consumption of executives' time and energy, clerical labor in the filling out of separate sets of forms, not calling for identical data and therefore not answerable by carbon copies or simple transcription—and all this notwithstanding a commendable effort by the Census and the F.P.C. staffs to co-operate. Without that co-operation, so far as it was effective, the burden on the utilities might have been considerably heavier.

In the ELECTRICAL WORLD of July 1 Carter Field has given some estimates of the cost of reports. A minimum is $15,000,000 a year for those required by the federal government alone.

Who pays? The taxpayer—and that means about 130,000,000 of us if we pay rent or eat foodstuffs or smoke cigarettes or use manufactured goods or pay direct taxes—for government overlapping; the user of electricity and the thrifty citizen, who with his savings has bought a bond or a share of stock, for needless work by the utilities.

Another Angle to Prudent Expenditures

WHEN electric utility service fails in an emergency, restoration becomes the primary objective of the operating company and indeed of suppliers whose help is required. Economy has to stand aside, and not until conditions approach normal can sharp-penciled accountants and acute executives tackle the problem of balancing dollar outlays and results obtained.

Two electric utility witnesses called into the hearings before Governor Saltonstall of Massachusetts in connection with Public Works Commissioner W. F. Callahan's defense of his post-hurricane expenditures revealed this point quite effectively. S. R. Keyes, purchasing agent of Boston Edison, and George S. Hewins, construction manager of New England Power Service, both showed that emphasis must be on restoration when overcoming the effects of calamity. Overtime payments, rush transportation, housing, board of foreign crews, urgent need of materials and supplies swept out of local markets by peak demands, these and many other factors tend to press costs upward during unwonted "blackout" periods.

Mr. Keyes' statement that relations with suppliers to the Boston company are so satisfactory that "they were glad to help us out and not take advantage (in prices) of our emergency conditions" speaks for itself. The September 21 hurricane of last year cost the company about a million dollars, including lost revenue. It cost New England Power about four millions. Mr. Hewins pointed out that overtime and rush demands for hired equipment pushed up costs, but material costs per unit did not increase to any extent. Delay in service restoration, this witness said, might also cost more in lost revenue than the savings possible through more leisurely procedure. G. K. Manson, chief engineer of the New England Telephone & Telegraph Company, put the case graphically by saying that to estimate what a major restoration job like this might have cost under normal conditions merely would be interesting mental gymnastics.

While such comments of course do not justify palpable waste of money, labor and materials, they do indicate clearly that prudence in expenditures cannot be judged without taking into consideration the necessity of the heat of the moment, whether it arise from work caused by a hurricane or just normal construction.

What Regulator Steps?

THE most prevalent approach to the range of functioning of the step-type regulator for branch feeder service has been to give it range of 10 per cent, adjustable for either buck or boost, and to provide four 2½ per cent steps. Undoubtedly this range magnitude bears a relationship to the corresponding figure which has been most common for induction-type feeder voltage regulators. Discussion at several group meetings has, however, raised the question whether these steps are most advantageous for the branch feeder service for which the step-type is particularly well qualified. Sentiment is growing stronger for five 1¼ per cent steps.

This comes about when considering the upper and lower values of the band of voltage to which the first and last customers are subjected during maximum circuit load conditions, allowance having been made for reasonable latitude in setting the contact-making voltmeter (say ±2½ per cent and ±1¼ per cent respectively for 2½ per cent and 1¼ per cent steps). Assuming 100 per cent as the minimum permissible primary voltage at the last customer, this means that the band maximum at the first customer would, with two 2½ per cent steps, be from 107.5 per cent to 102½ per cent (105 per cent ± 2½ per cent) and, further, the line could have only 2½ per cent drop to the last customer and still deliver 100 per cent voltage under adverse conditions of regulation.

On the other hand, five 1¼ per cent steps would narrow the band to 107.5 per cent—105 per cent (106.25 per cent ±1¼ per cent) values for the first customer at the regulator, most of the difference being due to the finer setting of the contact-making voltmeter for the narrower steps. The significant fact which throws favor toward the 1¼ per cent steps is that under these assumed conditions the line drop from the regulator to the last customer could be 5 per cent, which is twice as great as in the case of 2½ per cent steps.

The Next Administration

By CARTER FIELD

This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

IS Franklin D. Roosevelt going to be President of the United States for four more years? If not, will he be succeeded by (a) a man of his own choosing who will carry on his policies, (b) a more conservative Democrat, with views somewhere in the span covered by John Nance Garner at one extreme and Harry Flood Byrd of Virginia at the other, (c) a "compromise" liberal Democrat, such as Burton K. Wheeler of Montana, (d) a conservative Republican, such as Senator Robert Taft of Ohio, or, finally (e) a "liberal" Republican, such as Thomas E. Dewey?

This is not intended as a complete picture of what may happen, of course, but it is the general outline. Obviously the possibilities are of tremendous importance to every one living in the United States, or even greater importance to every one doing business in the United States, and almost of life or death to such an industry as the electric utility business.

It is of *immediate* importance because the stage is being set—right now—for the selection of the government which will run this country for the four years beginning in January, 1941. As of now, anything can happen. Certain things can be *made* to happen. But the making will probably be in the hands of a few score of politicians, some of whom are not of the highest calibre, even as politicians go in this country.

Anything Can Happen

There is still time for the average American business man to put in his oar. Sometimes this is not true. Sometimes poltical situations develop when mass psychology makes it virtually impossible to change the current—to prevent the election of this or that man, to force a party to take a particular stand on an important issue, or even to pay any attention to an issue.

That is not true today. The door is wide open. Almost anything can happen, but, unless there is a development which has never occurred before in measurable force, the selection of the next President will be made by men and women interested in staying on the payroll, or getting on the payroll (if they are Republicans), rather than by people vitally interested in the *kind* of government we will live under for the next four years.

Recent votes in the Senate and House disclose how mixed up the political situation is. Enough Democrats have been following what is loosely termed the Garner leadership so that, when voting with the Republicans, the New Deal has been beaten more often than it triumphed in this session.

This means that there will be a real fight for the Democratic nomination. Naturally, with a prospect of possible victory after seven lean years, there will be a real battle for the Republican nomination. But the important thing for every business man interested in the kind of government we are going to have for the next four years is to make his influence felt *before* the nominations are made. After they are made he will merely have the choice between the two parties. It may easily happen that neither will suit his own ideas very well.

But for the ordinary business man, his time too much occupied to bother with party politics, to make his influence felt is not easy. Above all, it cannot be done by proxy. It positively cannot be done by contributing to this or that organization which seems to be advocating his ideas.

That route is open to many groups in this country—to labor, to prohibitionists, to old-age pension advocates (though the boys on Capitol Hill certainly worried Dr. Townsend a good deal), to reformers, especially if their "reform" can be called "moral." But absolutely not to men and women advocating changes which are calculated to be to the advantage of big business, or utilities.

Remember the Liberty League? Check over the list of directors of that organization and read a file somewhere about its purposes. Study its statements. Then ask yourself what chance *any* organization would have which would be battling to nominate a President and write a platform to be fair to the electric industry!

No, this business of a business man or an investor trying to make his influence felt toward naming a Presidential candidate or writing a platform can be done in only one way, and that one way requires personal attention and a good deal of effort. It must be done by individuals, as individuals, working solely within the confines of their own state, and mostly within the confines of their congressional district.

No Chance for Pressure Group

Every business man and investor can find out who will be the main factors in picking the candidates for delegates from his district to the national conventions of the Democratic and Republican parties. Sometimes the delegates are elected in primaries, but the candidates for delegate are *selected* before that. The time to start making one's influence felt is *before* the candidates for delegate are selected. After the organization slate has been made up is, ninety-nine times out of a hundred, too late to accomplish anything.

Most of the political bosses are far more interested in winning the election than they are in the economic or social views of the candidate, or in the kind of government that will result from his election. Hence, they will be strongly inclined to be for the candidate who gives promise of being a winner. Therefore, they never fail to find out just what the pressure groups want.

But because of inexorable facts—as demonstrated by the Liberty League and many other illustrations—business men and investors pretty nearly have to make their influence felt without the benefit of organizations. They must do it individually.

NEWS OF THE WEEK

Two Texas Utilities Sign LCRA Power Contracts

President Roosevelt praises move of co-ordination of public and private power facilities — Expresses hope that co-operation will be manifested in other areas — LCRA to get $700,000 annually

The first major move of co-ordination of public and private power facilities was completed last week with the signing of a contract for the sale of power by the Lower Colorado River Authority to the Texas Power & Light Co., Electric Bond & Share subsidiary.

Under the terms of the contract the Texas utility will buy power amounting to approximately $700,000 annually for distribution to its customers throughout the central part of the state.

The action was characterized by President Roosevelt, in a letter to Rep. Lyndon Johnson (Dem., Tex.), as the evidence of co-operation between the government-financed public project and a neighboring private utility. In acknowledging the report on the surplus power contract, President Roosevelt wrote Representative Johnson:

Roosevelt Praises Action

"I was glad to receive your letter telling of the progress of the Colorado River Authority. It shows that it is possible for a neighboring private utility to co-operate with a public power development to the advantage of both and the public. I hope that this co-operation will be manifested in other areas where similar problems arise."

This contract provides the fourth major outlet for the power generated by the dams making up the LCRA project on the Colorado River. The project is already supplying power to the city of Austin and to several large rural electrification projects. It will sell power directly to approximately 15,000 consumers in the sixteen counties where it is acquiring the distribution lines of Texas Power & Light Co. at a price of $5,000,000.

Under the terms of the contract signed last week LCRA is to sell 60,000 kw. of power to Texas Power & Light and Houston Lighting & Power Co. This is to be divided 24,000 kw. of primary and 36,000 kw. of secondary, with provisions made for such additional amounts of secondary power as are available. T. P. & L. is to take 45,000 kw. and Houston 15,000 kw. of capacity.

Can Recapture Power

The contract is to run until 1950, or any later date on two years' notice, and provides that if the LCRA sells power to municipalities or to other customers now served by the two Texas utilities the companies can reduce the amount they are obligated to take. Certain clauses in the contracts permit the LCRA to recapture power to supply to municipal plants in cities that may later decide on public operation. The authority has not abandoned its policy of selling to municipalities and rural electrification projects, but has arranged with the Texas utilities to dispose of surplus power over present demands.

Under the terms of the contract the utilities are required to pass along to consumers any savings which are made through the purchase of the surplus power.

The LCRA has already reached an agreement to purchase facilities of Texas Power & Light in sixteen counties. These facilities represent approximately 10 per cent of gross revenue.

At the last annual meeting of stockholders C. E. Groesbeck, chairman of Electric Bond & Share, stated that co-ordination of public and private power facilities was necessary in order that all concerned might gain full benefits of cheap electricity and to prevent destructive competition. He said that such a move would end the threat of government competition and would promote the highest use of electricity at the lowest possible cost. The LCRA contract marks the first major move in that direction. It is understood that the Electric Bond & Share management is working along the same line as a solution to the competitive power problem in the Northwest created by the Bonneville and Grand Coulee projects.

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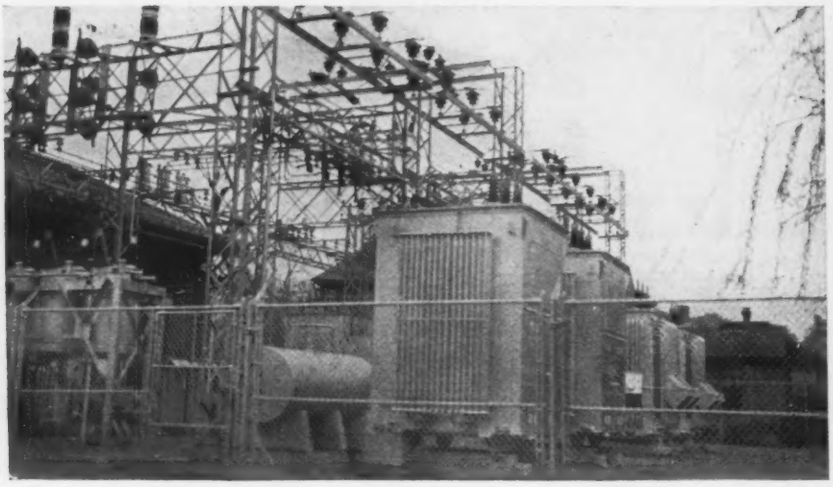
Small Unit Becomes Wholesale Customer

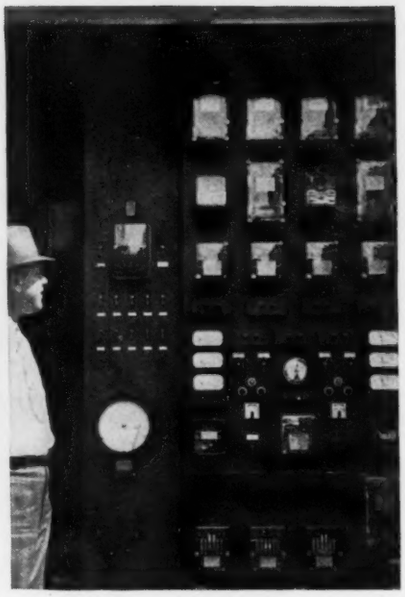
Passage of the last generating plant in the service area of the Wisconsin Power & Light Co., that was powered by steam engines with boilers using sawmill waste as fuel, occurred recently when the Tigerton Electric Co. became a wholesale customer of the utility.

Until recently the engine and boilers of the Tigerton Lumber Co. have been fairly adequate and have been the only power source of a local utility supplying electric service to this Shawano County village of 850 population, as well as to the unincorporated village of Shepley and about 150 customers along 55 miles of rural distribution line owned by the Tigerton Electric Co.

In many Wisconsin communities electric power originally was a by-product of operation of sawmills, feed or grist mills. But as years passed mills ceased to operate or their power facilities proved unequal to the increasing demands for electric service.

Faced with the necessity for additional supplies of power to meet in-





MODERN SUBSTATION—This new automatic and non-attended outdoor substation in Montgomery of the Alabama Power Co. replaced the old rotary substation. Superintendent L. A. Chambliss viewing the front of the switchboard controlling 44-kv. breakers

creasing customer demand, the Tigerton company considered two possibilities; installation of generating equipment or purchase of power. Choosing the purchase plan, it spent about $12,000 to build a 12-mile transmission line to connect its own substation with the power company substation at Wittenberg.

In addition to saving the difference between cost of the transmission line and generating equipment the Tigerton company will save in operating costs, purchasing electric power cheaper than it could be generated locally.

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Pennsylvania Lists Rural Construction

Pennsylvania electric companies built 2,230 miles of new rural lines in 1938 at a total estimated net cost of $4,199,536, according to a summary by the bureau of engineering of the Public Utility Commission.

The survey shows that 6,476 new extensions were built, that 16,251 rural residents contracted for the service and that 6,381 of these were farmers. Construction of the lines also made electricity available to 5,258 other potential customers.

Average construction cost per mile to the utilities was $1,880; average monthly guarantee of electricity to be used per customer was estimated at $2.63.

West Penn Power Co., with 2,697 new extensions and 902 miles of line, led the 23 companies studied. Estimated net construction cost was $2,012,656. The report shows that 7,808 customers contracted for service, 2,209 of whom were farmers. The area developed contains 2,357 potential customers.

Alabama Power Opens Automatic Substation

Alabama Power Co. recently completed the new Jefferson Street substation in Montgomery which replaced the old rotary substation. The new station is completely automatic and non-attended and all equipment is outdoors except mercury-arc rectifier and street-lighting equipment, which is indoors in the old brick building which was erected many years ago.

Power is supplied to the 44-kv. bus from two 44-kv. lines: the "A" line from Tallassee and a new tap from the primary substation—gas plant line. Two modern 44-kv. breakers and an outdoor cabinet containing control equipment are installed to provide both a synchronism check scheme and a throw-over scheme, thus insuring service to the station from two independent sources of power.

Five unit type substations are installed, four feeding independent 4-kv. feeders in the business area and one spare feeding station service. A 4-kv. ring bus provides a flexible operating set-up enabling one or more units to be paralleled.

Each unit type substation is completely self-protected and is housed in a steel tank approximately 8 ft. square and 10 ft. high, weighing 25 tons. Each unit has a capacity of 1,500 kva. with natural air circulation and 1,875 kva. with its own automatic blower fan equipment. For protection in case of winding failure, 44-kv. fuses are provided inside the tanks.

Modern high-speed air circuit breakers are provided to trip for 4-kv. feeder trouble. Relays, reclosers, meters, etc., which are mounted on a switchboard in the front of the unit provide metering and automatic control of each unit. Thermal relays start the blower fans when the oil temperature reaches 65 deg. and locks out the unit for dangerously high temperature. Voltage output of each unit is maintained by an automatic tapchanger which operates in ¼ per cent step. Each oil compartment of the unit is protected by nitrogen gas held under ½ lb. pressure.

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Poletti Urges Adoption of St. Lawrence Proposal

Acting Governor Charles Poletti of New York this week urged the adoption of the State Power Authority's proposal for public development of hydro-electric power on the St. Lawrence and Niagara Rivers.

Speaking at the International Old Home Week celebration at Watertown, the Lieutenant-Governor stated that Canada had developed cheap power rates under publicly developed systems. He charged that private power interests had brought about defeat of a constitutional amendment to assert the state's ownership of water power resources during the 1938 State Constitutional Convention. Mr. Poletti was author of the proposed amendment.

•

Fair Attendance Record

Attendance records at the exhibit of the Consolidated Edison Co. at the New York World's Fair were shattered on July 22 and 23 when capacity crowds brought to more than 2,800,000 the number of persons who have viewed the "City of Light." More than 80,000 visitors packed the diorama on Sunday. A record high attendance of 144,500 visited the exhibit over the week-end.

FPC Rules Jurisdiction Over Intrastate Utility

Finds that transmission facilities of New Jersey company are utilized to transmit energy in interstate commerce — Says New Jersey Power & Light violated power act in purchase of stock

The Federal Power Commission held last week, in a precedent-setting decision, that it had jurisdiction over an electric utility whose physical lines were located wholly in one state but whose lines comprised part of the pathway by which electric energy is transmitted in both directions across state lines.

The decision was made in the case against New Jersey Power & Light Co., which acquired 341,350 shares of common stock of Jersey Central Power & Light Co. without prior authorization from the commission. The commission started its proceedings on June 7, 1938, and has ruled that the acquisition of the stock was a violation of Section 203 (a) of the Federal Power Act.

Utilities Deny Violation

At the hearings conducted by the FPC last year both utilities contended that Jersey Central is not a public utility within the meaning of the act, and therefore denied any violation of any nature. Jersey Central Power & Light owns and operates transmission facilities extending from the substation adjacent to its generating plant in South Amboy to the south bank of the Raritan River, where such facilities are joined to the lines of Public Service Electric & Gas Co.

The findings of the commission state that transmission facilities are joined at the mid-channel of Kill von Kull with transmission facilities of Staten Island Edison Corp., which facilities extend from the point of connection to Atlantic substation of Staten Island Edison located in the State of New York; that such transmission facilities of Public Service Electric & Gas and Staten Island Edison are attached to the same common busbar at the Mechanic Street substation to which is attached the transmission facilities of Jersey Central Power & Light and Public Service Electric & Gas extending from Mechanic Street substation to South Amboy, N. J.

It was ruled that normally electric energy is transmitted daily in both directions over the transmission facilities of Public Service Electric & Gas and Staten Island Edison between Atlantic substation and Mechanic Street substation; that the transmission facilities described provide a direct and interconnected line for the flow of electric energy between the substation of Jersey Central Power & Light and Staten Island Edison—across state lines—and that energy was transmitted over such facilities on numerous occasions during 1936. 1937 and to September, 1938.

The commission ruled that these facilities were utilized to transmit energy in interstate commerce, and, therefore, Jersey Central Power & Light is a public utility within the meaning of the Federal Power Act.

Jersey Central Power & Light was formerly a subsidiary of the defunct National Public Service, one of the Insull holding concerns in the East. Associated Gas & Electric now holds the Jersey Central shares together with a substantial amount of the National Public Service debentures, collateral of which is the remaining outstanding common shares of Jersey Central.

•

Floating Steam Plant Holds Serviceability

In 1930 the floating power plant *Jacona*, rated at 20,000 kw., was installed by the Public Service Co. of New Hampshire at Portsmouth and in 1934 it was drydocked for inspection and maintenance. In May of this year, according to a statement by J. Brodie Smith, vice-president and general manager, it was considered advisable to drydock the plant again at the U. S. Navy Yard in Portsmouth. The time selected was when water is available in large quantities in the rivers of the Granite State, so that the *Jacona* could easily be spared for a month or so.

While in drydock the plant was completely inspected and overhauled. The insurers who protect the company against marine risks found the hull and its appurtenances in excellent condition, and with all signs pointing toward a long and useful life. The utility's own inspection and overhaul, which were largely confined to the steam and electrical equipment, indicated no accelerated depreciation in this apparatus because of its presence in a floating plant. "Now, as in the past," Mr. Smith stated, "everything indicates that the *Jacona* is an economical plant, having a life expectancy not much different than that of plants of similar size located on land."

•

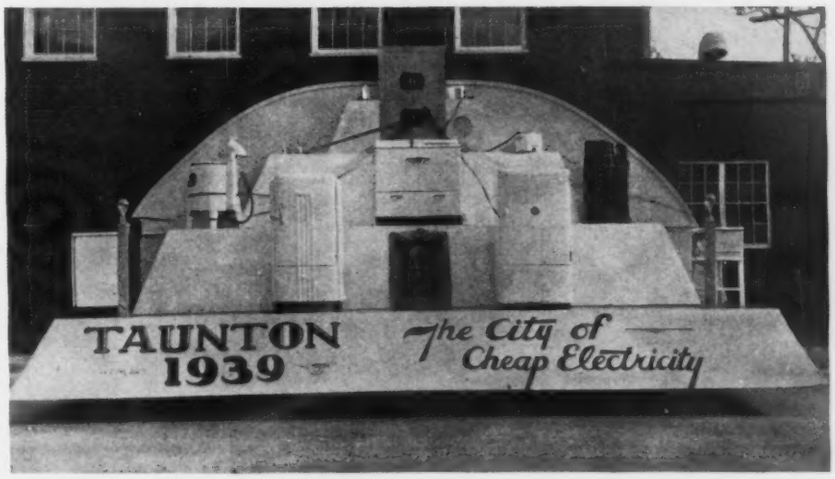
Postpones Santee Dam Bids

Opening of bids on the Santee Dam of the Santee-Cooper hydro-electric and navigation project in South Carolina, scheduled for August 1, has been postponed to August 29, according to Charles H. Gerald, secretary of the South Carolina Public Service Authority.

•

Electric Sales in Illinois

Total sales of energy to ultimate consumers in Illinois by eleven large electric utilities amounted to 583,136,400 kw.-hr. in June, 1939, as compared with 521,454,370 kw.-hr. for the similar month last year. This is an 11.8 per cent increase in sales.



CELEBRATES BIRTHDAY—The municipal light department had this display of electrical appliances for the home as its float in the tercentenary parade when Taunton, Mass., observed a birthday. C. F. Buckley is manager of the department

Bulletin Reports Research Activities

Marketing research activities of a selected group of manufacturers, located in all sections of the country, are summarized in a report issued by the Department of Commerce.

The report, based on questionnaires sent to 556 manufacturers, of whom 188 were carrying on marketing research studies, was prepared by the Marketing Research Division of the Bureau of Foreign and Domestic Commerce in cooperation with the American Marketing Association. It reveals that the average firm among those conducting research activities spends $21,000 per year for work done within the organization and $8,000 per year for marketing research purchased from outside agencies.

Among the subjects of research reported in the questionnaires are the potential market for a product or line of goods, comparisons of distribution with competitive products and analyses of the consumer market by sales territories.

Copies of the report, entitled "Marketing Research Activities of Manufacturers," and further identified as Market Research Series No. 21, may be obtained for 25 cents each upon application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from any district office of the bureau located in the leading commercial centers of the United States.

•

Consolidated Edison Shows Gains in Air Conditioning

Air-conditioning installations placed on the lines of Consolidated Edison Company of New York, Inc., during the first half of this year numbered 318 totaling 10,612 hp., as compared with 212 installations totaling 9,582 hp. in the same period last year, according to E. F. Jeffe, vice-president.

Greatest gains were made in the 0-10-hp. classification, this year's installations numbering 157 with a total of 786 hp., as against 59 totaling 319 hp. in the same period last year. Air-conditioning installations at the New York World's Fair exhibits numbered 34, totaling 1,371 hp., 23 of these being over 20 hp. each and totaling 1,262 hp. This is in addition to the 51 installations totaling 5,215 hp., at the World's Fair by the end of 1938.

•

Safe Harbor Hearings Set

Public hearing to determine the actual legitimate original cost of additions, betterments and retirements made by Safe Harbor Water Power Corp. for the period from January 1, 1933, to December 31, 1937, has been ordered held by the FPC on September 11. At the same time the commission set the date for another public hearing to be held September 18 to determine whether an agreement under which the company sells all of its electric energy is a violation of the provisions of the Federal Power Act, and to determine whether the rates or charges for the sale of such electric energy to the Consolidated Gas Electric Light & Power Co. of Baltimore and the Safe Harbor Co. are unjust, unreasonable or unduly discriminatory.

•

Lilienthal Sees TVA Profitable Project

Plans for consummation of the sale of properties of Tennessee Electric Power Co. to the TVA and municipalities in the area moved forward this week as extension agreements were signed. Conferences are to be held to complete the proposed sale of certain other properties of Commonwealth & Southern units in Alabama and Mississippi.

This week President Roosevelt signed the bill permitting the purchase.

Last week David E. Lilienthal, TVA director, envisioned for President Roosevelt a bright future for the authority by predicting it would be "making money" soon and estimating that its eventual revenues would be $25,000,000 annually.

A supplemental order whereby Tennessee Utilities Corp. will obtain authorization from the FPC for consummation, as of August 15, of the sale of the Tennessee properties was requested from the commission this week. The original agreement signed May 12 provided for closing the deal on June 20.

•

Georgia Power Sales Gain

Power sales of the Georgia Power Co. for the first six months totaled 12,682 kw. of 30,094,000 kw.-hr., with an estimated revenue of $409,772. This represents 73.9 per cent of its revenue quota for the year, according to the utility.

•

Files Condemnation Suit

Thurston County public utility district has filed a condemnation suit against Puget Sound Power & Light, making the sixth condemnation action pending against the company. The Thurston district proposes to authorize $2,250,000 of revenue bonds to acquire the company's properties.

April Revenue 5.4% Above 1938

Revenue from ultimate consumers of the electric light and power industry in April is estimated at $183,833,200 by the Edison Electric Institute. Addition of other electric revenue brings the total to $185,987,300 compared with $176,417,700 a year ago, an increase of 5.4 per cent.

Sales of energy to ultimate consumers increased 12.0 per cent to 8,240,417,000 kw.-hr., the largest gains being in sales to electrified railroads and to wholesale customers, as is shown in the table. Company use accounted for an additional 185,402,000 kw.-hr., losses for 1,331,825,000 kw.-hr., the total output being 9,757,644,000 kw.-hr., or 10.9 per cent more than in April, 1938.

Classification of Energy Sales

April, 1939, Compared with April, 1938

Class	Kw.-Hr. (Thousands)	Per Cent Increase
Residential or domestic...	1,699,901	+ 7.7
Retail light and power...	1,594,312	+ 7.3
Wholesale light, power...	4,109,280	+17.5
Street and highway lighting	133,505	+ 2.3
Other public authorities..	192,137	+ 5.7
Street and interurban railways	322,060	— 2.9
Electrified steam railroads	150,618	+32.6
Interdepartmental	38,604	+ 7.3
Total consumers.....	8,240,417	+12.0

Output generated from fuels was 5,333,396,000 kw.-hr., up 13.9 per cent, and by water power 4,025,331,000 kw.-hr., up 7.5 per cent. In addition 398,917,000 kw.-hr. was obtained by purchase.

For the twelve months period the average sales per domestic customer rose 6.0 per cent to 870 kw.-hr., the average annual bill rose 2.0 per cent to $36.28, while revenue per kw.-hr. fell 3.7 per cent to 4.17 cents.

•

New Hampshire Rural Survey Is Launched

Under the sponsorship of the State Grange the New Hampshire Electric Co-operative, Inc., with William J. Neal of Meredith as president, has been organized with the objective of extending rural electric service in sparsely settled areas. Leon M. Huntress, former manager of the White Mountain Power Co., Plymouth, has been retained to co-ordinate proposed surveys of markets for new line construction, prospective customers and appliance requirements. It is planned to develop lines in territory now wholly or partially without electricity.

In the Lempster section about 114

miles of prospective lines have been mapped on a basis of four estimated customers per mile. In the Plymouth area it is believed that about 150 miles of line may be required, with 134 miles of potential lines in the Colebrook region. President Neal states that indebtedness involved in the building and equipping of the proposed lines will not exceed $335 per customer, including service connections.

•

Rankin Sees Power Fight as 1940 Political Issue

Representative John E. Rankin predicted this week that "one of the bitterest fights" in history would occur during the 1940 political campaign over the power issue. He emphasized in a formal statement that "one of the hottest campaigns in history is brewing over the power question."

Mr. Rankin is one of the leaders of the "power bloc" in Congress and a strong advocate of government ownership of utilities. He is a strong supporter of TVA and other government projects.

•

Test Run on New Generator Made by Consumers Power

The first test run of the new 35,000-kw. General Electric turbo-generator in the Morrow plant of Consumers Power Co. was made this week. The second unit, a duplicate of the first, in the plant at Comstock, Mich., is scheduled for tests the middle of October. This is part of the company's broad expansion program.

New Wholesale Rates Seen for Bonneville

New alternative wholesale rates for Bonneville power are expected to be approved by the Federal Power Commission shortly, according to Administrator Frank A. Banks, who returned to Portland recently after a conference with the commission.

New rates will contain a demand plus energy charge to meet the needs of low load factor customers. Another new schedule governs sales of dump or surplus energy to customers who will contract for the prime and secondary energy and who have their own generating facilities with which to pick up this dump load when it is not available.

These new schedules are expected to meet operating conditions of such prospective customers as the city of Eugene, Portland General Electric Co. and others who have sought contracts with Bonneville on a basis under which there would be some real saving that could be passed on to their customers.

•

Utility-Co-op Dispute in Pennsylvania Settled

Two rules issued against West Penn Power Co., Pittsburgh, to show cause why penalties should not be imposed for having violated the Public Utility Law by installing rural line extensions in territories already pre-empted by Central Pennsylvania Rural Co-operative Association, now Central Electric Co-operative, Inc., have been discharged by the Public Utility Commission.

The dispute between the utility and the co-operative has been settled under conditions mutually satisfactory, and the commission is of the opinion that the agreement rendered further prosecution unnecessary. West Penn Power Co. was charged with having installed rural extension lines on State Highway Route 268 near Parker's Landing and on State Highway 68 near East Brady, after pre-emption of the territory by the co-operative.

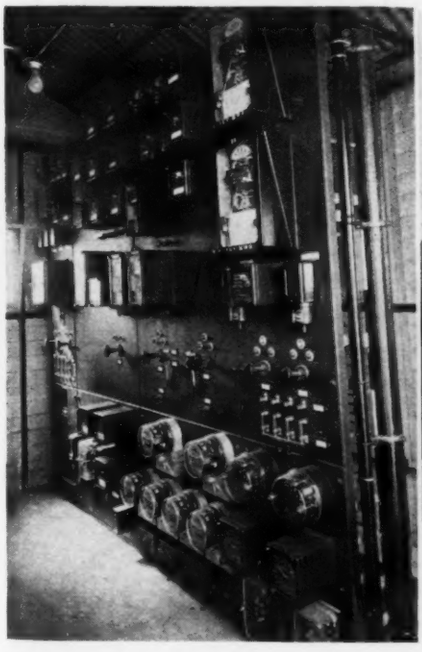
•

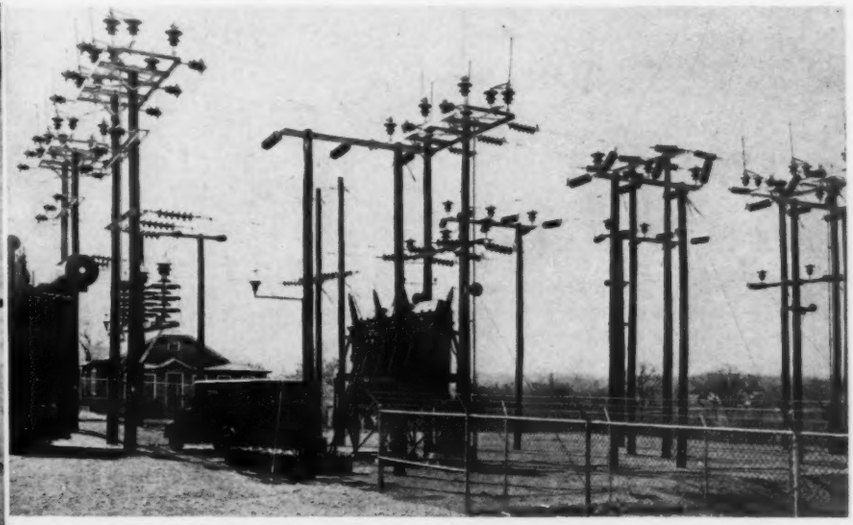
Treated Pole Output Dropped 16% in 1938

During 1938, 3,545,077 poles, totaling 12,751,961 lineal ft., were treated, as against 4,217,621 poles, totaling 17,697,920 lineal ft., in 1937, according to the American Wood Preservers' Association.

Of the 1938 total, 2,591,280 poles, or nearly 73 per cent, were full-length pressure treated and slightly over 27 per cent were butt treated. Coal-tar creosote was used for treatment of 98.4 per cent of all poles treated. Pressure-treated Southern pine led the list with about 71 per cent of the total, approximately the same as in 1937; Western red cedar ranked second and Northern white cedar third. Douglas fir poles showed a 49.6 per cent gain last year, totaling 66,985.

In 1938, 230 wood-preserving plants were in existence in the U. S., 221 of which were in active operation and nine idle. Of the total, 26 were the properties of public utilities, mining companies and others. During the year eight new plants were built, six pressure and two non-pressure; six plants were abandoned, one pressure, five non-pressure.





SERVICE PROTECTION—Designed to back up energy supply into industrial Worcester by automatic switching, New England Power recently made this 15,000-kva. addition to its suburban station at Shrewsbury, Mass. The relay board inside the building to protect the equipment is shown

Wiring Bureau Plans Regional Meetings

Plans for a regional wiring conference to be held in San Francisco August 17–18 have been announced by the executive committee of the National Adequate Wiring Bureau.

Similar conferences are in prospect for areas including the southeast and southwest central states and the middle Atlantic and east north central states.

Based on the practical experience of scores of local adequate wiring activities, these round-table sessions are being organized to provide the answer to the main question, "How to do the job." This first-hand interchange of ideas and experiences among the local key men and others engaged in field and promotion work is expected to assist materially local wiring programs.

•

Plans Central Station Meet in South Dakota

Plans have been announced for the South Dakota Central Station Conference to be held at the Alex Johnson Hotel, Rapid City, S. D., August 3-4.

R. R. Herrmann, Northern States Power Co., will discuss "Load Building, Its Effect on Rates and Investment," and R. A. Phillips, Central Electric & Telephone Co., Sioux City, will talk on "Trends and Experience with Water Heating." "Adequate Wiring Serves and Saves at a Profit" will be the topic taken by A. B. Smedley, Anaconda Wire & Cable Co., Chicago.

•

Porcelain Group to Meet

The fourth annual forum of the Porcelain Enamel Institute will be held at Ohio State University, Columbus, on October 18-20, according to an announcement by Frank E. Hodek, Jr., General Porcelain Enameling & Manufacturing Co., chairman of the forum committee.

•

EHFA Closes Contracts

Electric Home and Farm Authority has announced that contracts had been closed with Ralls County Electric Cooperative Association, New London, Mo.; Northeast Oklahoma Electric Cooperatives, Inc., Vinita, Okla.; Washington County Electric Membership Corp., Sandersville, Georgia; Blachly Lane County Co-operative Electric Association, Blachly, Ore., and the Midwest Electric, Inc., St. Marys, Ohio. Contracts provide that EHFA and the utilities will co-operate in financing the sale of electric appliances for use by consumers located on the utilities' power lines.

Contract has also been closed with the Northeast Oklahoma Electric Co-operative, Inc., Vinita, Okla. Contract covers the financing of the wiring or rewiring of homes and farms. Recent contracts have also been closed with Northern Indiana Public Service Co. and with the Georgia Power Co.

•

Johnson Declines REA Job

Representative Lyndon B. Johnson, former youth administrator in Texas and now a pro-third-term Roosevelt man, declined an offer from the President of the appointment as REA administrator to succeed John M. Carmody. Significant fact is that Mr. Roosevelt did not consult Secretary Wallace, who is very anxious to have a man with a farm viewpoint appointed to the job, according to Washington sources. Mr. Johnson is regarded as the most left wing of the Texas delegation since Maury Maverick was defeated.

MEETINGS

American Transit Association—Annual convention, Los Angeles, Calif., August 10-11; San Francisco, August 14-15. Charles Gordon, managing director, 292 Madison Av., New York, N. Y.

International Association of Electrical Inspectors—Joint annual meeting, northwestern and southwestern sections, Hotel Empire, San Francisco, Calif., August 14-18; western section, Hamilton, Ont., September 11-15; southern section, Asheville, N. C., September 18-22.

Illuminating Engineering Society—Annual meeting, Fairmont Hotel, San Francisco, Calif., August 21-25. Howard M. Sharp, general secretary, 51 Madison Avenue, New York, N. Y.

National Association of Railroad and Utilities Commissioners — Annual meeting, Seattle, Wash., August 22-25. Clyde S. Bailey, secretary, New Post Office Bldg., 12th and Pennsylvania Avenue, Washington, D. C.

Maryland Utilities Association—Annual fall convention, George Washington Hotel, Ocean City, Md., August 25-26. J. H. Purdy, secretary, Lexington Building, Baltimore, Md.

Rocky Mountain Electrical League—Annual convention, Estes Park, Colo., September 7-9. George E. Lewis, manager, Gas and Electric Bldg., Denver, Colo.

Electrochemical Society—Fall convention, Hotel Commodore, New York, N. Y., September 11-13. Dr. Colin G. Fink, secretary, Columbia University, New York, N. Y.

Wisconsin Utilities Association—Annual convention, accounting section, Plankinton Hotel, Milwaukee, Wis., September 21-22; electric section, commercial and technical divisions, November 6-7, Schroeder Hotel, Milwaukee. A. F. Herwig, executive secretary, Room 502, Brumder Bldg., 135 West Wells St., Milwaukee, Wis.

National Industrial Advertising Association—National conference, Hotel New Yorker, New York, N. Y., September 20-22. William H. Easton, chairman, publicity committee, 420 Lexington Av., New York, N. Y.

American Institute of Electrical Engineers—Great Lakes district, Minneapolis, Minn., September 27-29. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

Indiana Electric Association—Annual convention, French Lick, Ind., September 28-30. Tom C. Polk, secretary, 607 Traction Terminal Bldg., Indianapolis, Ind.

Inquiry Completed by Research Group

At a recent meeting of the American Research Committee on Grounding, the technical subcommittee reported on the eighteen investigations made during the past year of electrical grounding on pipes within buildings to the fourteen national organizations co-operating in this enterprise.

The committee has found various unsafe and unsatisfactory conditions in electric wiring, water pipes, gas pipes, etc., and even violation of established good practice, but has been unable to find any case where electrical grounding was a material factor in causing any damage.

The committee is anxious to obtain additional field cases where it is believed that electrical grounding might have some effect on corrosion of piping, impairment of water, sparking, or electric shock.

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Allows Property Transfer

Warning that the "acts of these companies in attempted transfer of facilities subject to the jurisdiction of the commission without prior commission authorization constitute no safe precedent for a similar course of conduct by any other 'public utility' in the future," the Federal Power Commission has conditionally approved the sale of facilities of the Western Light & Power Corp. to the Oklahoma Gas & Electric Co., upon the execution of new instruments in so far as subject to the jurisdiction of the commission.

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Gets Extension of Time

Extension of the time for complying with the provisions of an order relating to filing of a statement on the original cost of its properties has been granted California Oregon Power by FPC. The utility was authorized to defer until December 31, 1939, its compliance with the provisions of Electric Plant Accounts Instruction 2-D of the Uniform System of Accounts, dated May 11, 1937, on which the commission had previously granted an extension to the company.

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Railway Closes Plant

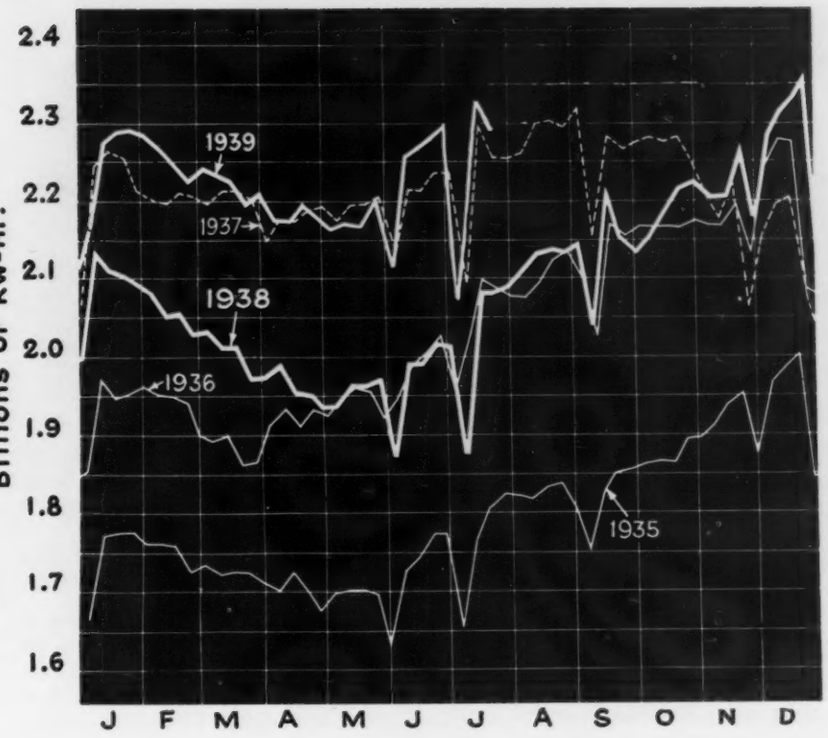
The power plant of the Harrisburg (Pa.) Railways Co. was closed July 20, the first day it has not generated electric power in many years, because the company has substituted buses for trolley cars. The last street car was operated in Harrisburg on July 16.

Output Dips—Holds 10% Gain Over '38

Higher outputs than in any preceding summer continue to characterize the operations of the electric light and power industry, although there was a recession of 1.3 per cent from the recent peak to 2,294,588,000 kw.-hr. in the week ended July 22, according to the Edison Electric Institute. The movement was similar to that of the corresponding period of 1937, but a little less pronounced, so that the gain over 1937 increased to 1.6 per cent. There was a moderate decline also at this time in 1936.

Compared with 1938 the increase amounted to 10.1 per cent, against 10.5 and 11.5 per cent, successively, in the two preceding weeks.

Regional gains over 1938 were nearly the same as in the week of July 15, excepting a shrinkage from 11.6 to 6.2 per cent in the Middle Atlantic states and in increase from 4.3 to 7.0 in the West Central. They continue largest in the Mountain and Central Industrial areas.



Weekly Output, Millions Kw.-Hr.

1939		1938		1937	
July 22	2,295	July 23	2,085	July 24	2,259
July 15	2,324	July 16	2,084	July 17	2,298
July 8	2,078	July 9	1,881	July 10	2,096
July 1	2,300	July 2	2,015	July 3	2,238
June 24	2,285	June 25	2,019	June 26	2,238
June 17	2,265	June 18	1,991	June 19	2,214

Per Cent Change from Previous Year

Region	Week Ending July 22	July 15	July 8
New England	+ 9.2	+13.6	+ 9.3
Middle Atlantic	+ 6.2	+ 9.2	+11.6
Central Industrial	+13.1	+12.9	+13.6
West Central	+ 7.0	+ 6.0	+ 4.3
Southern States	+ 9.9	+ 8.7	+ 8.4
Rocky Mountain	+15.2	+18.2	+15.8
Pacific	+ 7.1	+10.2	+ 7.6
United States	+10.1	+11.5	+10.5

Request FPC Permit for Merger Program

Sanction of the Federal Power Commission for the consummation of the proposed merger of electric facilities of the New England Power Co. with facilities of Bellows Falls Hydro-Electric Corp. and a portion of the facilities of the Connecticut River Power Co. has been applied for by the New England Power Co. All the utilities involved are subsidiaries of the New England Power Association. On July 18 a petition of the three companies seeking a declaratory determination by which the commission would disclaim jurisdiction was denied by the commission, and the new application has been filed as a result of this ruling.

The transaction for which the utilities seek approval is to be carried out under an agreement whereby the New England Power Co. would purchase all the facilities, consisting principally of a hydro-electric generating plant on the Connecticut River and appurtenant transmission facilities of the Bellows Falls company, for $12,381,739, and a portion of the transmission lines of Connecticut River Power Co., being the New Hampshire portion of the so-called Bellows Falls-Pratts Junction transmission lines connecting the lines of the Bellows Falls company and the New England company. The Connecticut company's facilities under the agreement are to be acquired for $672,747 cash.

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Canada Hydro Plants Total 8,190,772 Hp.

Present recorded water-power resources of the Dominion of Canada amount to a total of 20,347,400 hp. under conditions of ordinary minimum flow and 33,617,000 hp. ordinarily available for six months of the year, it is stated in the annual review of the water-power resources of Canada by the Dominion Water and Power Bureau, Ottawa. This quantity of power corresponds to a potential turbine installation of 43,700,000 hp. The existing total turbine installation is 8,190,772 hp. Thus more than 80% of Canadian water power still awaits development.

The review supplies information in condensed form on the total available and developed water power in each province, progress in the development and utilization of power, including data on individual plants, the use of water power in the central electric station industry, and the pulp and paper, mineral and other industries, capital invested in water-power development and the coal equivalent of developed water power.

Copies may be obtained free of charge on application to the Controller of the Dominion Water and Power Bureau, Department of Mines and Resources, Ottawa, Canada.

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Chattanooga to Build

Contingent upon consummation of plans to purchase the properties of the Tennessee Electric Power Co. the TVA will take over in its entirety the eight-story general office building of the utility in Chattanooga and the Electric Power Board of Chattanooga will buy land and erect a $300,000 structure to house its general offices. The building will be financed by using a $150,000 PWA grant and $150,000 due it in the form of a reduction from its original share of the cost of the Tennessee Electric Power purchase.

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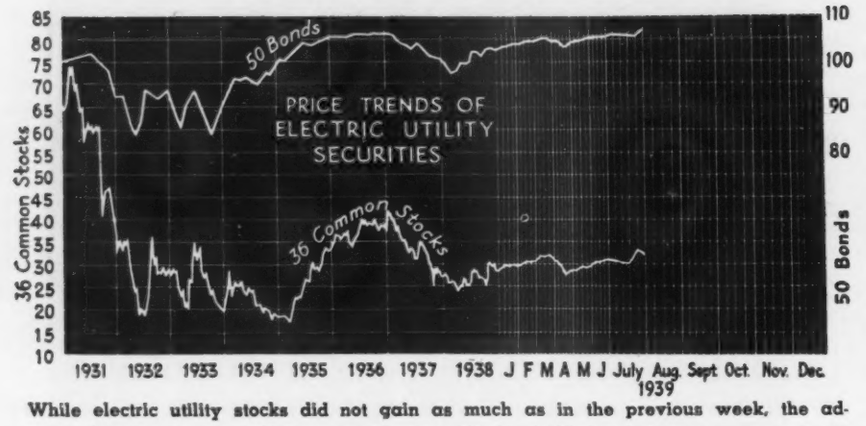
Plans Contract Awards

Pacific Gas & Electric will award contracts soon for construction of steam plants at Avon and Martinez, Calif., to cost more than $150,000.

Stocks Climb to New High


50 Bonds
PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
36 Common Stocks
36 Common Stocks
50 Bonds
1931 1932 1933 1934 1935 1936 1937 1938 J F M A M J July Aug. Sept Oct. Nov. Dec.
1939

While electric utility stocks did not gain as much as in the previous week, the advance last week was sufficient to raise the "Electrical World" index of common stocks 0.3 point to 32.3, a new high for the year to date. Bond index held at 105.9

Kansas Power Offers $26,500,000 Issue

Offering of $26,500,000 of first mortgage 3½ per cent bonds of the Kansas Power & Light Co., due 1969, was made this week. The bonds were priced at 108½ and interest.

In the open market the bonds went to a premium.

Net proceeds from the sale of the issue, amounting to $28,025,735, after deducting $196,765 estimated expenses, together with $3,500,000 to be derived from a bank loan, will be applied primarily to the redemption of the company's $28,440,000 of outstanding 4½ per cent first mortgage bonds, due in 1965, at 108.

The new issue will represent the company's only mortgage debt on completion of this financing. The total redemption price of the 4½s to be retired is $30,715,200, exclusive of accrued interest. An important feature of the new first mortgage issue is the provision for sinking fund which requires payments of $170,000 each year from 1940 through 1949, and of $520,000 each year from 1950 through 1968, subject to adjustment under certain conditions if all of the company's gas properties should be released from the lien of the mortgage.

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Two Utility Subsidiaries Seek to Sell Properties

Two subsidiaries of the American Utilities Service Corp. have filed applications with the Federal Power Commission for authorization to sell all of their electric facilities located in West Virginia and Kentucky.

The Southern Utilities Co. has requested authority from the commission to sell its facilities in West Virginia to the Appalachian Electric Power Co. for $80,000 in cash, and the Southern Public Service Co., an affiliate, seeks authority to sell its Kentucky facilities to the Kentucky & West Virginia Power Co., Inc., for $70,000 in cash. Both applicants have their principal offices in Ashland, Ky.

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Permitted to Intervene at Interlocking Hearing

Federal Power Commission has granted the petition of the Puget Sound Power & Light Co. to intervene in the applications of Nelson J. Ambrose and others for authorization to hold interlocking positions. The company asked permission to intervene and be a party to the proceeding respecting the determination of the public utility status of the Puget Sound Power & Light Co. within the meaning of Section 201(e) of the Federal Power Act.

In its petition the company, which is a subsidiary of Engineers Public Service Co., stated certain officers or directors of the company have filed applications for authority to hold positions as officers or directors of two or more public utilities which are subsidiaries of Engineers Public Service Co., but have not regarded and do not regard the Puget Sound Power & Light Co. as a public utility within the meaning of the Federal Power Act.

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Seeks to Sell Facilities

Authorization from the Federal Power Commission to sell its electric facilities to Consolidated Gas, Electric Light & Power Co. of Baltimore has been sought by the Maryland Public Service Co., Frederick, Md., a subsidiary of NY PA NJ Utilities Co. The transaction involves $14,650 and the facilities consist of a 4,600-volt, three-phase, 60-cycle, wood-pole distribution line, 7 miles long, at the Pennsylvania-Maryland state line.

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Huge Utility Issues Filed with SEC

Large security offerings have been filed recently by electric light and power companies with the SEC.

Pennsylvania Power & Light Co. has filed a statement covering $95,000,000 of 3½ per cent first mortgage bonds, due August 1, 1969, and $28,500,000 of 4½ per cent debentures, due August 1, 1974.

Iowa Public Service Co. has filed an issue of 3¾ per cent first mortgage bonds, due August 1, 1969, to the amount of $14,250,000.

Central Ohio Light & Power Co. has filed application under the Holding Company Act asking exemption from the requirement for filing a declaration in connection with the proposed issue and sale of $4,100,000 of 4 per cent first mortgage bonds, series C, due August 1, 1964, $500,000 of 3½ per cent serial notes, due 1940 to 1944 and 2,200 shares of $6 cumulative preferred stock, no par value.

New England Power Co. has filed a registration statement covering $9,650,000 first mortgage bonds, series B, due August 15, 1969.

Union Electric Co. of Missouri has filed a notification of registration under the Holding Company Act.

The commission has issued an order approving the reorganization plan of the Mountain States Power Co., a subsidiary of Standard Gas & Electric Co.

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Dakota Merger Voted

Stockholders of the North Dakota Power & Light Co. and the Northern Power & Light Co., operating in North and South Dakota, have voted in favor of a merger of the two companies at a recent meeting. The new company will be known as the Dakota Public Service Co.

Utility Reports

	Net Income 1939	1938
*Connecticut Lt. & Pwr.	$3,744,404	$3,574,435
*Detroit Edison and subs.	9,589,731	7,444,936
†Duquesne Lt.	9,568,543	9,351,504
*Kansas G. & E.	1,204,930	1,293,549
*Long Island Ltg.	1,227,356	893,290
†Louisville G. & E. (Del.) and subs.	1,292,225	1,503,417
*Minnesota Pwr. & Lt.	1,225,851	1,301,255
*Nebraska Pwr.	1,901,463	1,894,515
*Pacific Pwr. & Lt. and sub.	950,994	793,054
†Philadelphia Co. and subs.	5,621,446	5,822,266
*Tampa Electric	1,497,173	1,512,427
*Utah Pwr. & Lt. and subs.	1,543,998	1,447,599

*Twelve months ended June 30.
†Twelve months ended May 31.

Lloyd M. Long, Dallas, Tex.

"Lighting for Revenue"

MONEY in the till.

That's what more and more utility sales and top executives are seeing in lighting sales promotion. And the evidence thereof appears in the thirty or so case studies in the following pages.

For five years ELECTRICAL WORLD has published an annual editorial feature devoted to the value of lighting as a load builder and a revenue producer. Each year the response from the field when material is sought for this annual feature becomes larger and more enthusiastic. And more specific and actual, too, as the emphasis of the theme shifts with the passing of time from the potentialities to the accomplishments of lighting as a revenue producer.

In the articles presented here there is no unsupported talk of what lighting *can do,* but there is real experience testimony of what lighting *is doing* to increase revenues.

Load building is not an end in itself. To be worth while, it must be profitable, must survive through all the accounting and appear in the figure of net revenue down in the lower right-hand corner. The evidence presented here proves that lighting fills that prescription. Its cost of selling is low. Its revenue contribution is high. That's the combination that makes net.

Space limitation did not permit publication in this issue of all of the articles that came in for the feature. The necessity for geographical diversity in order to present a national picture was also a limiting consideration. Much of the excellent material that could not be published now will appear in later issues of ELECTRICAL WORLD.

And we repeat ———

"Lighting for Revenue"——

Lighting profitable to utility and to customer, too—this is the Vogue Market in Huntington Park, Calif. Inside the shop eighteen 300-watt opal glass open-bottom units and over the fruit stand twenty 200-watt spun aluminum units give light of 45 to 55 ft.-candles intensity on the merchandise

Commercial Lighting Load at 7.2 Cents per Dollar of E.A.R.

By R. C. McFADDEN
Sales Manager Southern California Edison Company, Ltd.

DURING 1938, with nineteen commercial lighting salesmen in the field, the Southern California Edison Company, Ltd., added 22,934 kw. in new commercial-industrial lighting load, of which 8,200 kw. was purely creative. This added load gave us an estimated annual revenue of $969,242, or $42.26 per kw.-year. Some of this load admittedly earns a return considerably below the average, while some, particularly the lighting of the open-front type of supermarket, which seems to be peculiar to southern California, will return in some cases upward of $100 per kw.-year. Our figures show that the cost of adding this new lighting load amounted to $69,804, or $3.04 per kw., or 7.2 cents per dollar of added annual revenue, which would seem to prove once more that the commercial lighting load is surely the "cream of the crop."

This record is felt to be commendable in view of the fact that the territory served by the Southern California Edison Company is unique, as it contains no large metropolitan cities, the largest city, Long Beach, having a population of about 160,000.

Most of the area served is highly developed agricultural country, with about forty cities and smaller towns scattered throughout, and since we have no rain during the entire summer, the irrigation pumping load has made possible a rather dense coverage of almost the entire area.

Our commercial lighting salesmen, practically all of whom are trained engineers, are spread out over an area of almost 50,000 square miles, with headquarters in the division and district offices, some of them about 200 miles distant from the general offices.

These men sell no merchandise or equipment, their efforts being concentrated on sales through and with the co-operation of the architect, builder and electrical contractor. This method, we have found, helps materially in maintaining excellent relations with the contractor group, and we find that only very seldom does the contractor attempt to break down the standards set up by our men in their recommendations to the consumer.

Survey Shows Home Lighting Job Is Hardly Started

By HARRY RESTOFSKI
Sales Promotion Manager, West Penn Power Co.

AVERAGE living room lighting is not good.

Average wattages in scientifically designed modern lamps are much greater than in other types.

Portable lamps are used much more than fixtures in living rooms.

Empty sockets continue as a major problem in home lighting.

Customers are pretty well satisfied with their present poor lighting. Therefore there remains to be done a tremendously big educational job.

These conclusions, more corroborative of general opinion among promoters of good lighting than startlingly new, derive from preliminary examination of data obtained in a survey of residential customers made for the West Penn Power Company by an independent organization using trained interviewers. The survey, of which the tabulated data and results will be published in a later issue of ELECTRICAL WORLD when analysis is completed, was undertaken to obtain information on customer attitudes toward electric services in the home, present uses of these services and the possibilities of their enlargement. In particular regard to lighting, the living room was used as the yardstick and the following points were covered:

Number and wattage of Better-Sight lamps: The average living room has 0.466 Better-Sight lamps. The average wattage per lamp is 220.

Number and wattage of other portables (including Pin-It-Up lamps): There are 2.03 other portables per living room, and the average wattage is 50.04.

Sockets filled and empty or with burned-out lamps in ceiling and wall fixtures and in all portables. The living room has an average of 3.93 sockets in fixtures and 3.63 sockets in portables. In the fixtures 27.9 per cent of the sockets are inoperative, and in the portable lamps, 13.55 per cent. The average for all living room sockets is 20.6 per cent.

In addition, customers were asked to say whether they thought their present lighting was very good, fairly good or not very good. Only 6⅓ per cent thought their lighting not very good. They were also asked to point out the last lamp or fixture installed and when it was purchased, and to indicate what, if any, improvements in lighting are contemplated. They

"Lighting for Revenue"

were told the average cost of operating a 100-watt lamp under West Penn rates and were asked if they considered such a cost reasonable, high or very high.

A total of 300 interviews were made in the survey, care being taken to have proper representation of customers from each of the economic quartiles. Because of this, examination of the interview records as they accumulated gave ample evidence that to make more than 300 interviews would be only to add unnecessary proof to facts already firmly established and would uncover no new information. These facts, from which the previously stated conclusions are easily apparent, prove that home lighting is a field of load development that has hardly been scratched and that Better Light-Better Sight and other promotional efforts, great as they have been and are, can be largely increased with profit to all concerned, to the customer most of all.

Selling Lighting by Keeping at It

By HOWARD M. SHARP
Manager Lighting Bureau, Buffalo, Niagara & Eastern Power Corporation

WE MAY be old-fashioned in our lighting activities, but we believe in selling any and all kinds of lighting in any amounts every day of the year. We do not put on any special pressure periods, but rely upon continuous customer contact. And to date this year we are 10 per cent above the same period in 1938. The lighting bureau consists of 24 commercial and industrial lighting sales people, 31 home lighting advisers and a special illuminating engineering section of five people. Every sales person has a definite district in which to work.

Each commercial man has on the average 1,400 customers and each home lighting adviser 7,000 customers. Last year we added 5,146 kw. of commercial and industrial lighting. Each completed job added 4.3 kw. This added load had an average burning period of 1,800 hours per year and was obtained at a cost of 63 cents per dollar of E.A.R.

The home lighting section turned in approximately 13,000 demonstrations, each demonstration resulting in the addition of 266 watts. Over the period of the year each adviser accounted for additional load at the rate of 589 watts per day. The cost of obtaining this business was approximately $2 per dollar of E.A.R. All additional lighting business is calculated on the basis of increment rate at which the load is added. The average for the bureau is considerably under 2 cents per kilowatt-hour for all such new business.

One of the most important phases of our operation includes the activities of the illuminating engineering section. This group is responsible for all wiring and lighting layouts, complete electrical specifications when necessary, equipment tests, new designs, and field studies on applied lighting research. This section acts in an advisory capacity for architects, jobbers and contractors, as well as assisting our own field men on specific jobs. We do not recommend the use of any lighting equipment until we have made sufficient tests on it to be reasonably sure that it will perform satisfactorily under the conditions for which it is prescribed.

The bureau is responsible for the illuminating engineering phases of all street lighting. We work in close co-operation with engineering, operating and management groups. Street-lighting possibilities are analyzed, application methods developed and all possible assistance given to the management, when requested, in the conclusion of specific contracts. Approximately 50 dangerous intersections, bridges, grade crossings, etc., have been lighted either with sodium or incandescent lamps and numerous installations in accordance with the I.E.S. Code of Street Lighting completed in various municipalities. The city of Niagara Falls is a specific example (see illustration) in that a complete program for the city has been worked out and almost half completed.

All-Employee Activity Sets National Record

By L. W. SYMONS
Merchandise Manager Lake Superior District Power Company, Ashland, Wis.

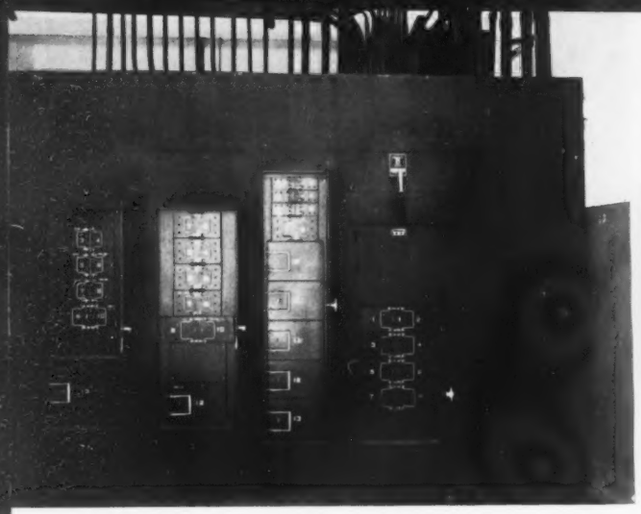
IN A lamp bulb activity, the results of which speak eloquently of the success possible with enthusiastically supported all-employee sales effort, Lake Superior District Power Company last fall set a new national record of 8.44 lamps sold per customer.

During the four-month campaign employees of this company, including the northern division of the Michigan Gas & Electric Company, in 26,947 individual sales sold 166,272 lamps, representing 11,449,446 watts, or an average of 68.9 watts per lamp. An average of 581.3 watts load was added to the lines per customer.

As already noted, the campaign was an all-employee activity. Special cartons of lamps were offered throughout the campaign consisting of one 100-watt, one 75-watt and four 60-watt lamps, with an extra 100-watt lamp given to the customer for buying a complete carton of lamps. Top honors among employees went to Rudolph Thompson, Ashland, meter reader, who sold 200 cartons alone.

To sustain campaign spirit throughout the four months, pep meetings were held in each district with employees. Some time during the activity each district was given a specific day on which to concentrate on lamps. On that day every employee was given part of the day off to contact customers for lamp bulb sales.

Result of utility street lighting co-operation—Niagara Falls business section has excellent lighting with twin 15,000-lumen units mounted 23 ft. high on opposite poles 90 ft. apart



Utility president helped sell this lighting job

Inter-Company Co-operation Boosts Commercial Lighting Sales

By D. J. FRANDSEN
Manager Commercial Lighting Sales, Public Service Company of Oklahoma, Tulsa

A FIVE-YEAR analysis of customer accounts indicates that added commercial and office lighting load sold by the Public Service Company of Oklahoma will produce an average annual revenue of $58 per kilowatt added. This value has been determined by a running check on *all* load sold and has been corrected for gravity increases. Except for losses due to customer turnover 95 per cent of all added load is in place and producing revenue two years after it has been added. Records have not been kept beyond the two-year period and the actual life of such added load is of course a matter of conjecture. In installations affected by customer turnover 80 per cent of all added load is in place and producing revenue at the end of the two-year period, and the remaining 20 per cent, except for meter turnoffs, has suffered only slight decreases.

Records compiled at the beginning of 1939 indicate that, on the average, sales made in 1937 produced in 1938 slightly over $8,800 per salesman in actual increased revenue—gravity load and new establishments not included. Over-all sales costs were in the neighborhood of 30 cents per dollar increase. Records to date indicate that results from 1938 sales will be somewhat better than those noted above, in so far as revenue per salesman is concerned.

No newspaper or radio advertising and but little direct by mail material are used in connection with commercial lighting sales. Dependence is placed almost entirely on direct canvassing coverage and on "on-the-spot" demonstrations, backed up by active sales assistance from the entire company personnel. Each salesman has a definite territory and a regularly assigned number of customers. Quotas are based primarily on calls and demonstrations. Little stress is placed on kilowatt load quotas. Salesmen are expected to produce profitable added net revenue. Kilowatt-hours are considered to be of more importance than kilowatts, and actual revenue of more importance than estimated increases.

Campaign methods are not used in connection with commercial lighting sales. This activity is a regular routine year-around function which produces sound revenue at a reasonable expense by the active assistance of all personnel, by repeated personal contact and by demonstration selling.

Pictured here are typical views of a complete rewiring and relighting installation which well illustrates the sales program of the company. The building involved has been completely rewired from street service to lighting outlet. It has been redecorated and 205 300-500-watt indirect Ainsworth fixtures have been installed to date. This detail is interesting because it illustrates the completeness of the job. The job is interesting because it illustrates the completeness of the selling coverage. The lead was developed and considerable sales resistance rendered throughout the entire negotiations by R. K. Lane, president of the Public Service Company of Oklahoma. The company's local engineers spent considerable time in consulting with the lighting department on wiring layout. If the lighting promotion activities of the company have any particularly interesting features, they are those factors of active executive interest plus assistance and of interdepartment co-operation.

Commercial Lighting E.A.R. at 20 Cents per Dollar

By R. W. HUDSON
Manager Lighting Department, Central Maine Power Company

DURING the year 1938 the lighting department of the Central Maine Power Company added to the lines a total of 560 kw. of commercial and school lighting load. It was estimated that the revenue increase would approximate $17,000 for the load added. This increase was derived from lighting sales to commercial establishments and school buildings and represents the net increase from sales by the company's five lighting engineers. This added load does not include that sold by jobbers, or others throughout our territory in which our engineers may have had some part.

During the past months we have studied the effect this increased load had toward increasing kilowatt-hours and revenue.

Ever since the beginning of lighting sales as a load-building activity it has been necessary to keep all kinds of statistics to prove or disprove the efficiency of the men and whether or not the activity could justify the expense. We have kept records of installations and checked each month from the

meter books to ascertain any increase. The information gained was very startling, for during the first six months of 1938 the gain in revenue from the installations being checked exceeded by $2,400 the actual over-all increase shown by all lighting customers. It was obvious in these cases that the added load was producing increased revenue.

The final figures for the year 1938 taken from our monthly revenue reports were as follows:

Number of commercial customers.... 11,082
Revenue increase 1938 over 1937..... $49,650.00
Per cent increase, approximately, 4 per cent.

The total expense of maintaining the lighting department for the year 1938 was $10,056. This figure compared to our total increase in revenue makes the cost per dollar of increased revenue approximately 20 cents. The increase in kilowatt-hours for the same customers was 2,435,000, which is just a little more than 10 per cent increase over 1937. Looking over the kilowatt-hour records for 1939, the total figure for the first six months shows an increase of 1,150,200 over the first six months of 1938.

Since this department was created in 1934 the record of revenue and kilowatt-hour increases and of expenses are as follows:

	Increases Over Previous Year Kw.-Hr.	Revenue	Total Cost of Lighting Sales Activity
1935....	Not available	$12,516.62	$5,562.00
1936....	Not available	46,004.07	8,477.00
1937....	2,702,465	21,310.61	11,395.00
1938....	2,435,369	49,658.51	10,056.00
*1939....	*1,150,200	*16,850.00	5,700.00

*Six months only.

In 1935 and 1937 the company effected rate reductions which showed very substantial savings to our commercial customers and is reflected in the above figures. While the lighting department may claim not to have been entirely responsible for the total increase, we do feel that for the amount of money spent the percentage of gain in lighting revenues exceeds that of any other classification.

The Sky Is the Limit

By J. E. NORTH

Chairman Better Light-Better Sight Bureau, Edison Electric Institute

LIGHTING, unlike almost every other element of electrical service, has no immediate saturation point. With light, the *sky* is the limit.

Sales managers of many electrical products have determined, with considerable accuracy, the limit or extent to which their products can be sold. Homes, once they are properly equipped with these products, are no longer a market, except for replacements. With light, this condition does not exist. Every home is a market *now* for *some* light and will continue to be a market for more and better light as time goes on.

Developments in the design and use of lighting equipment made within the life of the Better Light-Better Sight movement have shown that the market is continuously expanding. Just as fast as improved light sources and lighting equipment become available in practical form new uses for them are seen to exist on every hand. Higher intensities for easier and better seeing and for greater beauty are needed wherever eyes are used.

For our homes, offices, stores, industrial plants and for our streets and highways the Better Light-Better Sight program already has awakened the public's appreciation of what proper light will do. With a thoughtful and consistent educational program and through the use of aggressive sales plans *more* light and *better* light can become even a more universally desired product.

The dawn of a new day is ever before us in the lighting business. Scientists and engineers are constantly giving us new lighting tools. Facts proving what these new tools will do accumulate with each improved installation. New customers appear as fast as these facts become common knowledge.

To see the saturation point of the lighting industry look *up!* The sky *is* the limit because nature intended it that way.

Demonstration Truck Sells Outdoor Lighting

By R. M. BROWN

Director Lighting Sales Division, Indianapolis Power & Light Company

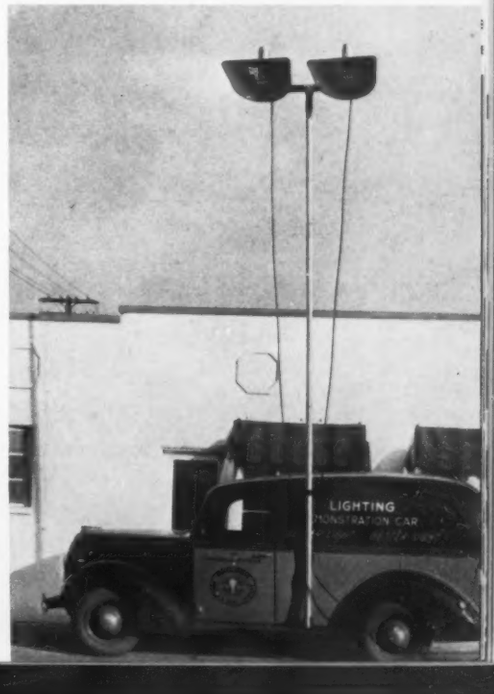
IN EIGHT MONTHS or so up to June, this year, the outdoor lighting demonstration truck shown in the accompanying illustration and operated by the Indianapolis Power & Light Company had made 245 demonstrations, of which about one-third resulted in sales. The average sale figured out to approximately four lighting units totaling 1,200 watts. The estimated annual revenue from this load increase is $4,800.

The telescoping pole on the side of the truck is in three 7-ft. sections. The tee at the top, holding the two lighting units, is removable and may be replaced with other fittings designed for other types of units. A mercury-vapor lamp transformer is carried inside the truck so that this type of lamp alone or in combination with Mazdas may be demonstrated. Inside the truck also is a reel holding 250 ft. of two-conductor No. 10 R. C. cable for service connection.

The largest prospect field in which the truck operates is naturally oil and gas stations. But there are many other worth-while prospects, including parking lots, used car sales lots, outdoor sports, etc.

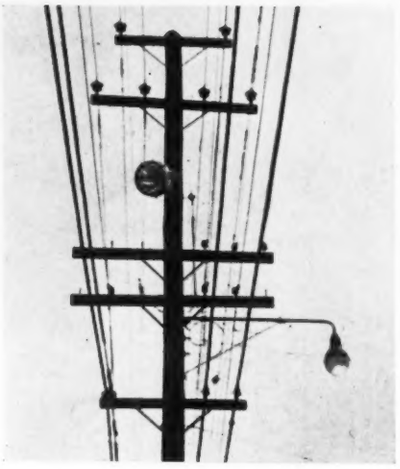
Also, the truck carries a fairly complete stock of all types of indoor commercial and industrial lighting equipment. During the day the truck is used in this field of selling. There is no way of determining what amount of indoor commercial and industrial load building should be credited to the truck, but it is appreciable, and this, added to the directly traceable results in outdoor lighting, makes us feel that the truck has been a profitable investment. So much so, in fact, that another will be added next fall.

Shows the customer outdoor lighting



"Lighting for Revenue"

The floodlight and its performance



New Slant on "Dusk 'Til Dawn" Floodlighting

By PAUL MANCHESTER and WALTER L. KELLEY, Jr.
Lighting Engineer Blackstone Valley Gas & Electric Company

REALIZING that many customers would benefit from the all-night floodlighting of their establishments, a "dusk 'til dawn" plan was developed by the Blackstone Valley Gas & Electric Company. It seemed logical to class this type of floodlighting with street lighting and to mount the floodlights on the company's existing poles.

The idea caught on, and requests for this type of lighting started to come in. First, the municipalities required such service for the lighting of traffic control areas, next a funeral home wanted "moon-lighting" as dignified advertising. In quick succession followed State Police barracks, monuments, bank façades, an all-night diner, a downtown ice cream parlor; 26 installations so far and more waiting to be surveyed.

A standard "copper kettle" General Electric floodlight is mounted on the nearest company-owned pole above the lower set of crossarms at heights varying from 20 to 35 ft. From a rough scale drawing of the building and pole location, the included angles of desired light spread are measured. The manufacturer's catalog data indicate the proper lens for the job. The particular light chosen has a very flexible focusing rod which allows not only accurate focusing but also the use of various lamp sizes from a 300-watt PS35 to a 1,000-watt G40, and corresponding series type bulbs.

A popular feature is the total absence of poles and other unsightly equipment on the customer's property. On a street-lighting pole the unit is inconspicuous and the source of illumination is not obtrusive.

The customer pays, when applying for this service, one year's rental of $15 in advance. He also pays the monthly street-lighting rate according to lamp size. The company furnishes the floodlight, makes the entire installation and assumes complete responsibility for maintenance. This includes lamp renewals on a lamp life basis and replacement of parts as needed. Night burn-outs are replaced the following day.

While it might appear that we are reverting to obsolete flat rate lighting schedules, it must be borne in mind that this plan definitely guarantees the burning hours and the full load. The idea of a fixed charge proves to be very popular with customers having a need for long hours use of floodlights. They usually hesitate to contract for metered service and the purchase of expensive equipment.

So far the "dusk 'til dawn" plan has been self-selling, but we are now planning a fall campaign which will include a photograph mailing of our outstanding installations to a selected list of customers.

Proves Selling Lighting Year-'Round Activity

By J. S. SUTHERLAND
Manager Sales Promotion Alabama Power Company

ARTIFICIAL illumination is recognized as a continuous necessity, yet the sale of lighting equipment is too often confined to spasmodic efforts during some seasons of the year. To capitalize on successful fall light conditioning activities, to demonstrate to distributors and dealers that lighting equipment can be profitably featured at all seasons an early spring campaign was conducted by the Alabama Power Company with their active cooperation. Three specific types of commercial units and the same number of residential units were selected to be featured during February and March, 1939. All manufacturers' units that conformed with the general types were given equal prominence. In this way any dealer, whatever his supplier connection, was free to participate. During the nine weeks of the campaign 6,928 special type fixtures were sold, against a quota of 6,500. This

Final Report of Spring Lighting Campaign—Alabama Power Company

Sales by Classes of Fixtures and of Jobs

	300/500-W. Indirect Comm. Fix.	300-W. Direct-Type-Store Fix.	150-W. Show Window Reflector	200/300-W. Indirect Res. Fix.	150-W. Drop Cord Adptr. Type Fixture	I.E.S. Type Portable Lamps	Total
No. Units	652	1,358	496	1,606	1,172	1,684	6,968
% of Quota	65.2	67.9	99.2	160.6	78.1	336.8	107.2
Retail Value	$7,609	$10,199	$1,427	$20,075	$2,109	$13,472	$54,891

Sales by Classes of Outlets

	Replacement		New Outlets		Total	
	No. Units	Value	No. Units	Value	No. Units	Value
Commercial	957	$8,401	1,549	$10,834	2,506	$19,235
Residential	2,888	16,021	1,574	19,635	4,462	35,656
Total	3,845	24,422	3,123	30,469	6,968	54,891

was 107.2 per cent of quota and represented a total merchandise volume of $54,891. All equipment was sold by dealers with the exception of 310 I.E.S. lamps sold by the company. During same period of 1938 only 150 I.E.S. lamps were sold by the company.

Double Barreled

To announce the activity, two campaigns were released simultaneously. One, entitled "Enjoy Better Light Tonight," was sent to all company employees and explained the purpose of the campaign; the advantages to the prospect, the merchandise to be featured, the quota, list of prizes offered by the company and method of procedure. The other, "Get Your Share," was sent to more than 350 retail members of the Electrical Appliance Dealers Association. The set-up contained an outline of the market, the immediate objective, a list of sales aids offered by utility and distributors, suggestions for their own activity and a list of the benefits to be derived.

The activity was opened by a series of meetings in the larger towns. The meetings were entitled "Lighting Previews" and sponsored jointly by distributors and manufacturers. Invitations were mailed out to architects, contractors, dealers and engineers. Attendance averaged well over one hundred per meeting and the 1½-hour program was usually prolonged several hours by discussions and requests for time for individual examinations of displays. More than two tons of equipment, representing six manufacturers, were exhibited. The two feature speakers were lamp manufacturers' representatives, who outlined the principles of correct illumination, the latest available light sources and the characteristics of fixtures for correct applications.

The distributors are highly pleased with the results of the meetings and plan to hold more frequent meetings to keep their dealers informed of the progress of artificial lighting. Although there were many "doubting Thomases" among the dealers who made only limited purchases for displays and who confined their activities to new outlets, the results as shown in the accompanying record data proved that the sale of lighting need not be confined to a few weeks or months, but should be pushed throughout the entire year. As proof of this is the fact that the total lighting sales for the year to date are running well ahead of the established quota and considerably ahead of the same period of 1938.

The 50 Foot-Candlers

By FRED J. BROWN
Central New York Power Corporation

WHAT is the "pulse rate" of your lighting personnel—the "heart" of your lighting load-building plans?

In 1937 we decided that "all work and no play makes Jack a dull boy." Why not introduce some fun and competition into the selling foray in such a manner as to increase the intensity of lighting installations being sold and to increase the sales production per man? After considering several plans, we adopted the idea of forming a "50 Foot-Candle Club," and decided to launch the club at a future sales conference.

Regulation set-up provided that commercial and industrial lighting salesmen would apply for membership based on the highest intensity installation sold during the previous six months. Installation must involve at least four fixtures giving general illumination and initial intensity must be measured 30 inches from floor on a horizontal plane.

Grades of membership are:

50 Foot-Candler	50 Foot-Candles or above
4th Runger	40 to 50 Foot-Candles
3d Runger	30 to 40 Foot-Candles
2d Runger	20 to 30 Foot-Candles
1st Runger	10 to 20 Foot-Candles

Membership status changes every six months, the standing of a particular member depending upon his current sale of highest intensity, so that while a member may be a 50 Foot-Candler at one meeting, at a six months later meeting he may only be a 3d Runger. At the fall and spring sales meetings those who have attained the grade of 50 Foot-Candler are given a memento for their accomplishments and only full-fledged 50 Foot-Candler members are eligible to hold office in this organization. The organization has special stationery, a president and a secretary, these officers changing every six months.

It has been interesting to follow through the analysis of the rating of the men who attained membership in the upper three brackets; that is, as full-fledged 50 Foot-Candlers, 4th Rungers or 3d Rungers. For the four meetings of the organization since its inception those in the three upper brackets were 62, 75, 93, and on June 30, 1939, 85 per cent of the club membership.

As to results, we definitely feel that the club is accomplishing the objectives for which it was started. Meetings of the club during, or immediately following, our semi-annual sales conferences have allowed the introduction of sufficient fun to help liven up the party. Anticipation of the club meeting is another factor of interest. Comments of the men in the field indicate their interest in attaining full 50 Foot-Candler grade of membership. The club will be continued.

Salesman got "50 foot-candler" rating for this job—Average of 60 ft.-candles on the meats from sixteen 200-watt lamps in Pittsburgh concentrating reflectors with concentric louver

Three six-man crews operating from these rebuilt buses distribute I.E.S. lamps house to house for free trial

Sell One Lamp in Three With Free Trial Plan

By F. F. McCOY
Wisconsin Electric Power Company, Milwaukee, Wis.

A PLAN of direct demonstration and selling of I.E.S. lamps has been carried on in Milwaukee during the past three years which is a radical departure from and an addition to our former methods of selling. Under the plan three crews of six men and a supervisor operating from a rebuilt bus or "lighting coach" place lamps on demonstration in customers' homes for a two-day period. Lamps are either sold or picked up at the end of this period and moved to another location as the activity continues.

Demonstrators average two lamps sold per man per day. Expressed in another way, one lamp is sold out of every three placed. Nor are the non-purchases lost. Out of 200 "no sale" demonstrations 67, or 33 per cent, had purchased lamps from other sources when a check survey was made six months later.

Consistent good results with a plan of this type appear possible only when the following points are observed:

1. A personalized offer amounting to an official introduction identifying the salesmen. The men inevitably secure an audience through an official "letter of introduction," consisting of "free trial" coupons with the customer's name imprinted from the meter lists.

2. Demonstration on the customer's premises.

3. Employing men of high caliber.

Reasons for the first two items are obvious to those familiar with direct selling and selling of illumination.

Along with such factors as proper selection, constant training and congenial crew operation, constant employment at reasonably high wages is necessary if high-caliber men are to be secured and trained for this work. Important factor in retaining of high-caliber men at Milwaukee is the fact that, during the dull season for lighting, the demonstrators are shifted to refrigerator sales. Consequently, the men feel that they are regular employees rather than part-time men subject to layoff at a moment's notice. This is extremely important in keeping a crew of high-caliber men, who naturally produce more and better sales and improve public relations.

In addition to the specific results stated, the trial demonstration plan has had several results not originally foreseen in their entirety which have considerable lighting promotion values:

1. *Point of Sale Advertising*—Appearance of the "lighting coach" causes more neck craning than a circus wagon. Children follow it, attracting attention—the banners tell the story. Housewives have, on occasion, called in to complain that they were overlooked.

2. *Entire Family Demonstration at Home*—This is much more valuable than having one member observe an effect in strange surroundings.

3. *Leads Obtained for Home Lighting Advisers*—This is possible because work of the two groups is made to dovetail rather than conflict.

4. *Plan Creates Business for Dealers*—The plan, by its city-wide demonstration of good lighting, is creating a market for lighting equipment from which the dealer benefits. At the same time the company is lifting the expensive burden of customer education from the dealers' shoulders.

Building Revenue With Lamps

By ARTHUR HUNTINGTON
Iowa Electric Light & Power Company, Cedar Rapids

A PIONEER in the study of the relations between lamp sizes, energy use of customers and revenue from domestic consumers, the Iowa Electric Light & Power Company continued its program in 1938. The general principle followed was to use lamps as load builders for consumers using less than 500 kw.-hr. per year and the evidence increases to point to the fact that lamps are the best builders of increased revenues for utilities.

At the end of 1938 the average domestic revenue was $36.84 and the

Table I—Kilowatt-hour and Revenue Data

Division	Increase for Five Years 1934-1938 Kw.-Hr.	Rev.	Rate per Kw.-Hr. for Inc.	Increase for Year 1938 Kw.-Hr.	Rev.	Rate per Kw.-Hr. for Inc.
A	322	$9.05	$0.0281	54	$1.75	$0.0324
B	203	3.27	0.0261	34	0.13	0.0038
C	214	5.42	0.0253	31	1.06	0.0342
D	294	5.21	0.0177	70	1.74	0.0248
E	180	5.62	0.0312	56	2.30	0.0411
F	167	3.69	0.0405	45	1.81	0.0402
G	155	4.42	0.0293	33	0.78	0.0236
H	189	3.51	0.0185	60	1.88	0.0298
I	98	2.43	0.0247	42	0.82	0.0195
*J	319	10.13	0.0392	119	2.47	0.0249
All	236	6.47	0.0272	42	1.30	0.309

*Three years' record.

average energy use 743 kw.-hr. This was a gain of $1.30 per customer over 1937 and an increase in use of 42 kw.-hr. The average rate for the increased use was 3.09 cents per kw.-hr. A study of Table I shows the results of 1938 operations compared to the total changes in domestic business over the five-year period from 1934 to 1938. It will be noted that the results vary in the several divisions of the property and, generally speaking, those that stand out were those that did an outstanding job on lamp sales.

The number of lamps used on the property increased from 500,000 in 1937 to 526,397 in 1938. Of the total of 164,047 lamps sold by company stores, 64,152 were from 7.5 to 50 watts and 81,008 were from 60 to 100 watts in size. The number of lamps sold of 150 watts and over was 18,624. There were 254 special lamps, mostly 150- and 200-watt sizes, which were not allocated. The average wattage of all lamps sold was 79.01. These lamp data include lamps sold by company stores only and for all classes of lighting.

Table II—Comparative Lamp Sales by Sizes for Iowa Electric Light & Power Co.

Meters in Service End of Year	1933	1934	1935	1936	1937	1938
Domestic	35,926	36,758	35,385	38,997	40,035	39,940
Commercial	6,560	6,978	7,545	7,662	7 559	7,734
Rural	2,198	2,252	2,753	3,288	3,677	3,823
Total	44,684	45,988	45,703	49,947	51,271	51,487
Lamps						
Total used on property	342,359	334,192	438,342	490,000	500,000	526,397
Sold by company stores	56,133	81,300	102,336	165,930	164,876	*164.047
Lamps per meter—Co. stores	1.25	1.76	2.23	3.32	3.22	3.18
*254 Special lamps not allocated.						
Lamps Sold by Sizes						
7½ Watts	.....	.....	.....	1,428	1,486	1,480
10 Watts	.....	.....	.....	1,444	2,089	1,814
15 Watts	.....	.....	.....	3,442	5,484	4,885
25 Watts	.....	.....	.....	23,204	20,554	21,023
30 Watts	.....	.....	.....	4,104	4,830	3,618
40 Watts	.....	.....	.....	23,587	21,026	21,519
50 Watts	.....	.....	.....	10,374	10,549	9,811
Lamps 7½ to 50 watts	.....	.....	44,130	67,583	66,018	64,151
Average watts per lamp	.....	.....	32.87	33.18	32.57	32.54
60 Watts	.....	.....	.....	38,592	41,939	37,077
75 Watts	.....	.....	.....	16,032	13,197	15,981
100 Watts	.....	.....	.....	20,322	23,164	24,146
50-100-150 watts	.....	.....	.....	506	116	30
100-200-300 watts	.....	.....	.....	5,773	4,096	3,769
200-300-500 watts	.....	.....	.....	.....	.....	2
No. of lamps 60 to 100 watts	.....	.....	48,015	81,230	82,512	81,008
Average watts per lamp	.....	.....	69.65	83.39	85.45	86.09
No. of lamps 7½ to 100 watts	49,033	72,150	92,145	148,813	148,530	145,159
Average watts per lamp	42.00	47.00	52.04	59.80	61.95	62.43
150 Watts	.....	.....	.....	8,396	8,703	9,340
200 Watts	.....	.....	.....	5,696	4,583	5,416
250 Watts	.....	.....	.....	73	364	157
300 Watts	.....	.....	.....	2,341	2,146	2,880
500 Watts and over	.....	.....	.....	611	550	841
No. of 150 watts and over	7,100	9,150	10,191	17,117	16,346	18,634
Average watts per lamp	165,000	179.00	193.00	204.47	197.71	211.37
Average wattage of all lamps (Sold by company)	57.55	61.85	63.14	75.46	75.41	79.01

Table III—Cumulative Revenue from 1934 to and Including 1938 per Domestic Consumer for the Property of the Iowa Electric Light & Power Co. and for the Industry

	Kw.-Hr. per Consumer	Inc.	Rev. per Consumer	Inc. per Year	No. Years on Line	Gross Inc.
Iowa Electric Light & Power Company	'34 507	.....	$30.37	.....	.....	.....
	'35 582	75	31.38	$1.01	4	$4.04
	'36 555	73	34.09	2.71	3	8.13
	'37 701	46	35.54	1.45	2	2.90
	'38 741	42	36.84	1.30	1	1.30
Total	.....	236	.....	6.47	.....	$16.37
NOTE—There were heavy rate reductions in 1934 and 1935. Correction in lamp and line voltage during those years reached all consumers and was a factor in holding up income. Voltage correction averaged about five volts on lamps and 2 to 8 per cent on line voltage. Rates in small towns revised in July 1938.						
The Industry	'34 624	.....	$33.07	.....	.....	.....
	'35 669	45	33.38	$0.31	4	$1.24
	'36 727	58	33.81	0.43	3	1.29
	'37 802	75	35.29	1.48	2	2.96
	'38 853	51	36.08	0.79	1	0.79
Total	.....	229	.....	$3.01	.....	$6.28
NOTE—The years 1934 and 1935 were years of rate revision for the industry as a whole.						

New Approach Makes Sales and Friends

By ROY K. BEAR
Commercial Sales Manager
Kansas Gas & Electric Company

IN ANALYZING the results of a recent successful commercial light conditioning campaign, in which we secured $31,223 of E.A.R., or 135.7 per cent of the quota, at a cost of 21 cents per dollar, we believe that the sales method used was the contributing factor. Due to the fact that many of our customers felt that their "light bill," as they chose to call it, was too high, we thought it necessary in preparing our campaign of 1938 to make an approach different from what had been used previously. With this thought in mind we decided to sell our customers on the value of the use of their existing equipment before we recommended or attempted to secure an increase in lighting.

Survey of Customer's Uses

Our approach on this was a survey of the customer's uses, in which we broke down the costs of the various services which he now had, such as electrical advertising, window lighting, interior lighting, special lighting applications, air conditioning, refrigeration, cooking and any others. After this survey was made a letter was written to the customer explaining the cost of each of the service applications and a detailed story told on the value of each. The letter then continued with a recommendation for additional lighting, stressing the value and low cost of operation and closing with a definite appeal for action.

During the fourteen-week period of this campaign our commercial salesmen made 440 surveys and written recommendations. As a result of this constructive, forceful sales approach, we added 615 kw. of lighting. In addition to the results obtained by the surveys and recommendations in which new load was added, it is felt that a great deal of increased use of present equipment was secured because we were able definitely to sell the customer on the value of making liberal use of the services.

To assist our salesmen in preparing their sales letters, we prepared a manual which we called "Printed Salesmanship," containing 25 sample letters designed to be used as a guide in writing letters to various kinds of business establishments.

"Lighting for Revenue"—

Fluorescent Lighting—A Promise and a Responsibility

By J. E. MUELLER
Chairman Lighting Sales Committee, Edison Electric Institute

FLUORESCENT lighting, like the sun at dawn, rises to change the aspect of the whole lighting horizon. The beautiful colors, cool foot-candles, higher efficiencies and approximation of daylight hold great promise for "high noon."

However, the *proper* development of fluorescent lighting is a challenge to the entire industry. The beauty of the sunrise has created a tendency to use its great promise to push application ahead of present commercial development. Because it is still too early to be wide awake, many have not realized that the more startling efficiencies are not ordinarily usable in general practice. There is a lack of equipment, in many cases, for proper application in accordance with good lighting principles, and as often as not the cost of providing comparable lighting is in excess of more conventional methods.

To meet this obligation and to take full advantage of the vast appeal of this new light source more emphasis must be placed on the development of equipment and the promotion of higher lighting levels—a greater range of equipment to produce good lighting—balanced equipment which will reduce wiring costs and annoying flicker—lighting levels never practical before, but already scientifically established as valuable—daylight intensities as well as daylight color values.

With these, the brilliant promise of the sunrise can develop into a great day for the lighting industry.

Intensive Cultivation Brings Results in Lighting Load

By R. A. GIBSON
Assistant Commercial Manager Hartford Electric Light Company

BEGINNING January 1 of this year our selling effort on the lighting load was greatly intensified and the coverage of the sales effort was broadened. It is much too early to predict the eventual results. However, present indications justify great optimism.

The results for the first four months show the installation of 483 kw. of lighting load in the commercial field, which is estimated to have an annual revenue of approximately $20,000. The domestic field, including the minimum-use customer group and some work done on our customers in general, shows increases which we estimate are equivalent to $6,100 per year in increased revenue. It must be remembered that the field force sells many other items in addition to lighting, and that the lighting shows a high proportion of results to actual time spent.

Each commercial customer was set up on a master card. There are about 7,500 of them in all. More than 15,000 minimum-use domestic customers were also set up in a card file at the same time. These customers have been divided up among 25 field representatives, both men and women. Some of these field representatives are part-time men in the field, such as branch office managers, and included also are the home service girls. The men have commercial customers and some of the minimum-use group. The girls have all minimum-use domestic customers.

To assist this group there is a staff of specialists in the lighting field, who go out with the field men and women on their calls as requested and who furnish the technical supervision and direction of the sales effort. Four such specialists are employed in the lighting field alone.

Each day each representative is given the cards for a number of his assigned customers. He makes his calls and reports progress to the specialist group. A follow-up record is also kept and the card will come out to the salesman automatically whenever the next call is required. The cards carry a complete record of the customer's account for the year and also other information which is useful for the salesman. By this assignment of calls the entire territory is intensively cultivated in a systematic fashion. Through the aid of the specialist group the very latest technical advances are made available to the field force. The preliminary view of this plan seems to indicate that the combination of a systematic cultivation of all the customers plus the close supervision of an adequate technical staff will produce results.

While we hesitate to make any prediction as to the comparative success of this or any other plan, we do know that lighting business in both the commercial and domestic fields can be obtained, and at a reasonable cost.

Add $14,200 E.A.R. With Special Lighting

By DALE REMINGTON
Wisconsin Public Service Corporation, Milwaukee

SYSTEMATIC canvassing, supplemented by thorough lighting surveys and demonstrations on the customers' premises using the very latest light sources and fixtures, appears to have contributed greatly to the success in Green Bay and Oshkosh of the campaign on special lighting conducted from last September to March this year by the Wisconsin Public Service Company.

In these two towns alone a total of 284.4 kw. of load was added, representing an E.A.R. of $14,215. Green Bay, with a population of over 37,000, contributed 172.1 kw. and an E.A.R. of $8,605 to this total, while Oshkosh, with a population of about 40,000, contributed 112.3 kw. and an E.A.R. of $5,610. In these divisions the company does not sell wiring and equipment necessary for lighting jobs. Lighting engineers merely make the surveys and prepare recommendations for the proper installation.

During the campaign lighting men thoroughly canvassed downtown stores to talk lighting. Light meters were used generously to show inadequacy of existing systems and demonstration fixtures set up to bring out graphically the effects possible with newer equipment.

Architects and builders were contacted during the campaign and the company's services offered in making lighting layouts. Calls were made on schools and public buildings in regard to lighting. School and playground lighting were developed and night lighting of athletic fields sug-

gested wherever possible. Industrial plants were encouraged to use better general lighting as well as improved local machine lighting wherever applicable.

Throughout the campaign the fullest advantage was taken of the new light sources and fixtures recently introduced. The new fluorescent lamps, the high-intensity mercury-vapor lamps and the new low-cost spot and floor lights proved to be of particular advantage in gaining the interest and enthusiasm of the proprietors.

Canvassing and demonstration were supplemented by direct mail presentations that were sent to the complete list of all prospects recognized as active by the lighting salesmen.

Off-Season Campaign Sells More I.E.S. Lamps

By LEWIS A. LEWIS
Assistant General Manager
Washington Water Power Company

FOLLOWING a successful company-dealer I.E.S. lamp campaign that ended in February this year, the Washington Water Power Company decided to try what could be done in the next two months, right through the so-called "off season." And in the "off-season" period, due to revived interest and reinspired promotion, sales averaged higher than in the earlier part of the campaign, the accomplishment being 159 per cent of quota (quota set on the same basis as for the holiday buying season), as against 116 per cent for the whole six months.

The campaign was started in October, 1938, ran into February and then extended two months. The accumulated quota of the entire period for the 66,000 customers of the company amounted to 860,200 watts; the actual sales were 999,365 watts in 9,721 I.E.S. lamps to make an E.A.R. of $26,000. Extensive newspaper advertising, employee tips and home service demonstrations were employed. How successful this and previous campaigns have been is shown by the following five-year record of I.E.S. lamp sales:

1934	4,000
1935	13,500
1936	10,379
1937	14,475
1938	15,619
Total	57,973

$56,000 Added Revenue From School Lighting Promotion

By G. W. OUSLER
General Sales Manager Duquesne Light Company, Pittsburgh, Pa.

DURING the past four years we have increased the lighting load in 238 of our 875 schools a total of 2,250 kva., an average of about 10 kva. per school. The estimated additional revenue from this increased load is about $41,000 a year. During this same period we influenced the lighting on nineteen new schools, with a total load of 1,130 kva. and an estimated annual revenue of $15,000. Without the school activity this load would have been far less.

Typical of the new schools where we had considerable to do with the lighting is the new Mt. Lebanon Junior High School, which has just been completed. This school has 29 classrooms, an auditorium, a kitchen, a cafeteria, shops and a gymnasium, with a total of 150 kw. of lighting. Luminous indirect units have been installed in each classroom—500 watts on the inside and 300 watts over the outside desks. Allowing for depreciation, this installation will provide 20 ft.-candles. The inner row of fixtures will burn all the time the classrooms are in use. The outside row of lights will automatically be controlled by electric eyes in each room.

An example of increasing the lighting in an older school is in the Ben Avon School District, where $15,000 was spent for relighting and rewiring two school buildings. This lighting was changed from four 150-watt lamps in direct glassware to six 500-watts or four 750-watt lamps in luminous indirect units, depending on the shape of the room. Upon examination of our records we find that before this lighting was installed we sold about 9,000 kw.-hr. to these two buildings. Today we are selling about 45,000 kw.-hr., or just five times the former amount.

Our school lighting activity includes promotion, education, direct sales contacts, surveys and recommendations. The majority of the schools are contacted by our commercial sales department, which consists of twelve salesmen. In addition to the school activity, these men are responsible for the sale of service to 33,000 small light and power customers. Four direct mail pieces are sent at monthly intervals in the spring, anticipating the remodeling activities of summer vacation. Two other pieces are sent in the fall and early winter in advance of the preparation of annual school budgets. These mailings are directed to about 1,100 school directors, administrators and architects in the two counties which we serve. Immediately following the installation of good school lighting in various communities, illustrated descriptions are sent to local papers. This free publicity is a valuable supplement to our efforts, because it broadens the realization of the benefits and growth of good school lighting and favorably advertises the

Typical School Lighting Loads Before and After Changes, Duquesne Light Company

School	Actual Kw.-Hr. One Month Year Before	Actual Kw.-Hr. Same Month After Inst.	Per-Cent Inc.
A	1,026	2,880	180
B	412	808	96
C	1,285	1,695	32
D	1,099	2,221	102
E	10,980	14,100	28
F	3,400	5,900	73

Typical relighted schoolroom—intensity of 20 ft.-candles from six Westinghouse Magnaflux fixtures on 11- and 12-ft. centers with 500-watt lamps in inside and 300-watt in outside row

"Lighting for Revenue"

school board's action to the community.

As an important part of our educational program we have taken three groups of school board officials and educators to Nela Park in Cleveland. We have found that such a plan aids our cause, in that the fundamentals of good lighting are explained by men not particularly interested in increasing the business of the Duquesne Light Company. On each of these trips, which were all-day affairs, we took about sixty educators. The cost of about $1,000 each was borne entirely by the Duquesne Light Company. The results, however, have more than warranted the expense, for, as indicated in the accompanying table, there has been a substantial increase in kilowatt-hour sales to schools.

Engineering Service and Trial Installations Build Lighting Revenue

By O. R. HOGUE
Manager Lighting and Wiring Sales, Commonwealth Edison Company

MORE THAN 80 per cent of the engineering layouts made during the past two years in commercial and industrial establishments of Chicago have resulted in increased load. Recorded layouts by the Commonwealth Edison Company during 1938 totaled 1,902. In some cases the increase was a few tenths of a kilowatt and only a fraction of the recommended amount. In others hundreds of kilowatts were added and the full amount recommended was installed and used. The additional load, including the new business involved, secured through layouts closed during 1938 was 11,902 kw.

Trial fixture installations, a vital companion of engineering service, were also big factors in the load-building program. A total of 4,722 kw. of added load was secured through trial installations made at 907 customers' establishments.

The advantage and success of this lighting load-building method lies in the effective way it answers the questions on "John Q. Customer's" mind. Quite often he turns down a relighting program because he is unable to visualize clearly one or all of the following:

What the lighting will mean to his establishment.

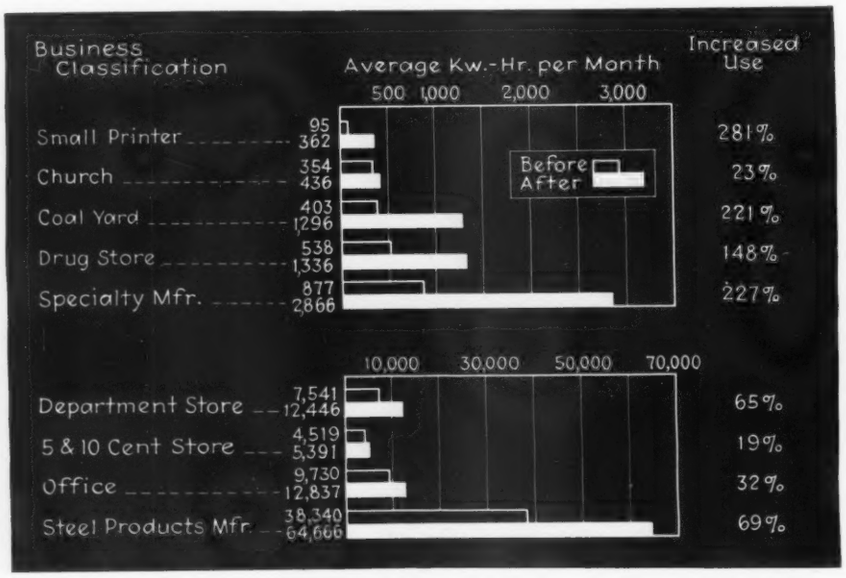
How the lighting will fit his particular needs.

What the lighting will look like after installation.

Summed up in a few words, "John Q. Customer" wants to have confidence in the value of the lighting job he is buying.

Fifteen illuminating engineers working with the lighting sales representatives in the districts answer these questions through surveys and recommended layouts. They study the customer's needs and work out in the proposal the definite benefits accruing to the merchant or factory owner. Confidence is built up through careful planning and presentation, in which the customer takes a large part. The complete layout, frequently submitted, specifies the type, location, wattage and installation of fixtures; includes cuts and sketches, and also a letter explaining the advantages to the customer. The trial fixtures installation registers in the customer's mind a picture of the lighting installation he is considering and shows its value to him.

Examples of this load-building activity are given in the accompanying chart. Meter book records were checked for a year before and a year after the additional business was sold. Care was taken to select examples where the floor area was not increased. At the present time a systematic survey of industrial and commercial customers is being carried on to bring plans and recommendations into the hands of as many as possible.


Business Classification
Average Kw.-Hr. per Month
Increased Use
500 1,000 2,000 3,000
Small Printer 95 362 281%
Church 354 436 23%
Coal Yard 403 1296 221%
Drug Store 538 1,336 148%
Specialty Mfr. 877 2866 227%
Before
After
10,000 30,000 50,000 70,000
Department Store 7,541 12,446 65%
5 & 10 Cent Store 4,519 5,391 19%
Office 9,730 12,837 32%
Steel Products Mfr. 38,340 64,666 69%

Every business can use more light—Average monthly energy use of nine individual customers before and after lighting improvement efforts of Commonwealth Edison

Major Leaguers Bat Out Sales

By R. W. BUTTS
Lighting Director, Ohio Public Service Company

WOULD you like to add an average of 92.2 watts per commercial meter and accomplish it in 90 days?

Here is the outline of an activity that did just that for the Ohio Public Service Company, and without any additions to the sales personnel.

Briefly, the activity was a commercial lighting campaign in which all classes of customers were contacted and all types of lighting equipment were sold, the quotas based on lighting load increases, not on equipment sales. The activity in general was designed as a major league ball game and was divided into two parts.

The first half, "Who's in the Majors," was a qualifying contest and covered a period of 30 days. Comparatively high kilowatt quotas were set up for each member of the commercial lighting department. Those making their quotas qualified for the second half of the activity or the

major league games and the ones who failed to make their quotas were to remain in the bush league. No bonuses or extra sales commissions were offered for this part of the activity as the pay-off was to come to those making their quota in the second half of the campaign. It might be mentioned that only one of the thirteen men in the contest failed to make his quota.

Now in the Majors

The second half, called "You're in the Majors Now," ran for a period of 60 days and a new kilowatt quota was established for each member who had made the major league. A special activity was set up for the one man who failed to make his quota and was the bush league all by himself, but he did not participate in the extra bonus; he attempted to qualify for a future campaign by making his bush league quota—he did.

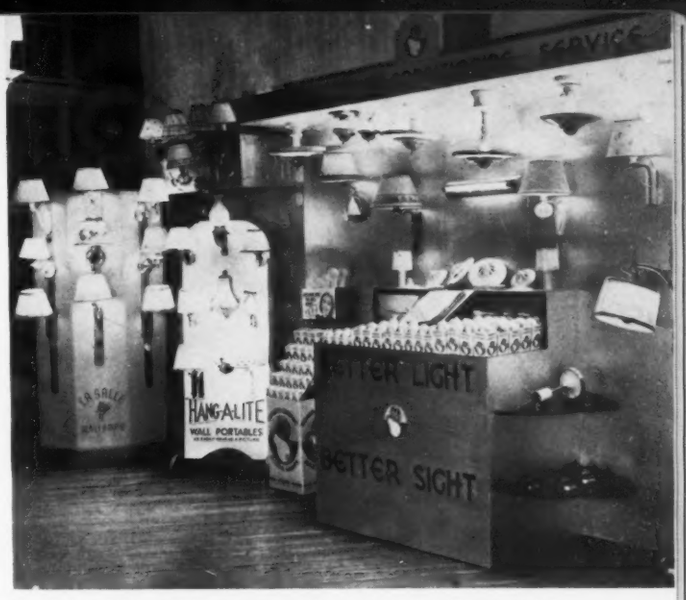
As there were two classifications of commercial contact men represented in this campaign, two bonus plans were set up. The one for those falling under the classification of commercial representatives was that, in addition to their regular sales commissions, they would receive, providing they made or exceeded their individual quotas, 10 cents for the first kilowatt, 20 cents for the next, 30 cents for the next and so on until the maximum of $3 was reached; all additional would then be figured at $3 per kilowatt.

For the salesmen falling under the classification of lighting advisers a similar sliding scale was used, except the first kilowatt started at 5 cents and continued upward until the maximum of $1.50 per kilowatt was reached.

The total of the quotas for the entire campaign was 612 kw. of additional lighting load and the department obtained a total of 873.6 or 151.7 per cent of the quota, an average for the 9,470 commercial meters of 92.2 watts.

Small Cost

The actual cost per kilowatt was small as it was obtained in addition to the department's regular duties, which include the sale of all types of commercial electric appliances, signs, lighting fixtures, public relations work and the many other duties of a utility salesman. The profit derived from the sale of lighting equipment would more than offset the bonus paid on this activity, but without taking this into consideration the cost per kilowatt obtained was $1.12. In all, we were exceptionally well pleased with the results obtained and these results are now being definitely reflected in the commercial energy use, which for the month of June shows the largest increase since the early part of 1937.



Dealer display tying in with utility silver bowl promotion

Silver Bowl Trial Sells 1,053,570 Watts

By J. M. STEDMAN
Manager Residential Sales, Pennsylvania Power & Light Company, Allentown

IN A three-week test campaign this past spring on light conditioning with "Packaged Lighting" and featuring the new silver bowl lamp 10,690 silver bowl Mazda lamps and 7,881 silver bowl adapters were sold with total lamp load of 1,053,570 watts.

Wattages ranged from 150 to 60 and the average wattage of these lamps was 98.6. In 1937 the average wattage of all multiple large lamps sold was 57.6, which includes commercial and industrial types. The figure for residential lamps exclusively would be even lower and more comparable with the above figure of 98.6 watts.

Our company tied in with a special activity of twenty distributors and 212 dealers located in Allentown, Lancaster, Harrisburg, Wilkes-Barre and Williamsport. We assisted in the selection of light-conditioning dealers, reviewed the plan before it was presented to distributors and co-operated in arranging joint meetings to introduce packaged lighting and light conditioning.

In conjunction with newspaper advertising of the lamp manufacturer, adapter manufacturers, distributors and dealers, we ran several insertions of four-column, 12-in. ads in 40 daily papers and two-column, 8-in. ads in 24 dailies and 80 weekly papers. Radio broadcasting was used in other sections of the territory by the manufacturers and distributors. Schedule included thirty spot broadcasts over three local stations.

Floor displays of the equipment and silver bowl lamps were erected on our sales floors in the test areas. Our field forces carried samples into customers' homes, and as interest was created in homes and in our stores company employees guided customers in the proper selection as to makes, model numbers, prices, etc., for specific applications.

Customers then took these "light-conditioning specifications" to dealers, who filled the orders. Our own purchases of silver bowl lamps in 22 *months* prior to the campaign were only 1,710. In the ensuing seven *weeks*, we purchased 3,936 silver bowl lamps.

Test Proves Out

Since the test campaign terminated interest in light conditioning and in the new silver bowl lamp has continued to such an extent that we are continuing our floor displays and field promotion until further notice and expect the activity to take on special emphasis this fall.

Of particular interest to us is the sustained interest of our sales allies, the dealers, who have found a satisfactory profit incentive in the sale of "packaged lighting." It has turned out that customers are buying not one silver bowl lamp but sets of lamps for their dining rooms, bedrooms, etc. The present follow-through has developed because neighbors order lamps after seeing customers' installations. As a result there is more interest and action in modern lighting equipment selling than through any other plan that has been used on our system.

Dealers did their part

Dealers Carry Flag in Bowl-Silvered Campaign

By J. M. DALY
Central New York Power Corporation

THROUGH the co-operation of 38 dealers and five jobbers, 5,595 units of bowl-silvered sight-saving equipment were sold in Syracuse, N. Y., in a campaign lasting only from March 1 to April 30, this year. The lamps sold with equipments designed for them averaged 101 watts in sizes from 60 to 150 watts. This amounted to an estimated load increase of 170 kw. In addition, many bowl-silvered lamps were sold for use in existing fixtures and dealers grasped the opportunity to sell standard lamps for other locations in the home.

The opening gun in the campaign was fired on February 23 at a dinner attended by lamp company and jobber executives, utility representatives and salesmen, followed the same evening by a meeting in the auditorium of the Central New York Power Corporation, at which the attendance of 188 was composed largely of dealers and jobber salesmen. At this meeting detailed plans for the activity were presented and discussed. A practicalized story of "The Science of Seeing" was related in a manner which could be used on the firing-line. The representative of the company which was providing the equipments to be merchandised with the bowl-silvered lamps described the test merchandising activities which had been run on smaller scale in various communities.

The kit of these merchandisers, comprising 30 items which could be purchased by the dealer at a 25 per cent reduction from regular dealers' cost, was then described item by item. Dealers were advised of other helps which would be utilized during the two months' campaign, such as newspaper display advertising tie-in, utility advertising, co-operation from the home-lighting department of the utility, etc. The enthusiasm at the meeting caused immediate sale of a large number of kits to dealers.

During the campaign period there was consistent co-operative newspaper display advertising by the lamp manufacturer, the equipment manufacturer, the utility and dealers. To help the dealers, window trim materials and interior display materials were provided by the lamp manufacturer at no additional charge with the purchase of kits. The whole activity revolved about "Save Your Vision" with "Light Conditioning." The accompanying picture of a dealer's window indicates how these merchandisers got into the campaign.

Year-'Round Creative Selling Brings Results

By J. E. HAMMOND
Illuminating Engineer San Joaquin Power Division, Pacific Gas & Electric Company, Fresno, Calif.

IN 1938 four commercial lighting salesmen and four home-lighting advisers sold 2,643 kw. of lighting for an estimated annual revenue of $66,268 to the San Joaquin Power Division of the Pacific Gas & Electric Company. This was all creative selling and no credit was allowed for load that "just came on the line." Our selling method is direct solicitation of the customer, with an appreciable amount of our business being repeat calls from satisfied customers and requests for advice from customers who have been told about our lighting department by satisfied customers. We conduct no campaigns or special drives, nor do we merchandise lighting equipment. We start a concerted program on January 1 and carry it through until December 31, with special attention to seasonal load. The results of this way of selling lighting appear in the accompanying summary.

We have been particularly successful in the promotion of school lighting. Close contact with city and county school authorities and systematic canvass of rural school boards have brought excellent results. We furnish speakers on the subject of lighting for Teachers' Institutes, P.T.A. groups, Trustee Association meetings, and have furnished lecturers for special sight conservation classes in the local State Teachers' College. At the present time we have in preparation lighting recommendations for four city school systems, in addition to six individual rural schools. Our recommendation of six 500-watt indirect luminaires per standard classroom has received excellent acceptance. More than 75 per cent of our relighting jobs has been up to this standard.

One phase of our work which has contributed much to our success in selling lighting is the preparation of plans and specifications. When an installation is sold we make a drawing and write a specification covering the wiring and lighting. This is given to the customer, who in turn lets the work to his favorite contractor or asks for bids. We find this method far more satisfactory than a verbal recommendation, or even the usual written one. The contractor has a plan covering the job and there is little likeli-

Summary of Results, 1938

Commercial Lighting

Number of salesmen	4
Kilowatt quota	1,200
Kilowatt sales	1,553
Estimated annual revenue	$47,876.00
Average annual revenue per man	$11,969.00
Revenue per dollar of sales expense	4.01
Average kilowatts per sale	4.4
Average rate per kilowatt-hour, cents	3.14

Domestic Lighting

Number of advisers	4
Kilowatt quota	864
Kilowatt sales	1,089
Estimated annual revenue	$18,392.00
Average annual revenue per adviser	4,598.00
Revenue per dollar of sales expense	2.21
Average wattage sold per call	464
Average rate per kilowatt-hour, cents	2.39

hood of changes being made to cut the job. If several bids are taken, they are all based on the same installation. On new installations where an architect or consulting engineer is employed we do not furnish this layout service except through them.

Our home-lighting activity has played no small part in the success of our commercial lighting sales program. Favorable reaction from work in the home has been reflected in our school and office lighting sales. The home-lighting activity is conducted on an "advisory service" basis with nothing to sell. It has been very satisfactory. The supervisor devotes a great deal of her time to talks before women's groups and home-making classes in high schools. Talks before sales groups of department and furniture stores have been responsible for the recommendation and sale of better domestic lighting equipment.

Direct Mail Builds Commercial Lighting

FOLLOWING upon the mailing to 87,000 commercial customers in the latter part of March and in the first week of April of a three-color booklet, entitled "40 Hints for Improving Sales Inexpensively," the Consolidated Edison Company of New York, Inc., experienced a rise of 100 per cent in commercial lighting studies in the months of April and May this year over the same months in 1938. This information was supplied by E. E. Jeffe, vice-president of the company, in response to a query as to the effectiveness of the mailing piece. In the three months of March, April and May this year the total number of studies made in response to customer requests was 1,024, as against 612 in the same period a year ago.

While it would be unjustified to ascribe the great increase in the number of studies entirely to the mailing piece, there can be no doubt that it was responsible for a large proportion of the rise in interest in lighting among commercial customers. Undoubtedly much of the effectiveness of the booklet was due to its appeal to the self-interest of the shopkeeper, its front cover and first two inside pages setting forth the factors that determine his profits or lack of them. Of the "40 Hints" that follow in the succeeding pages, four are concerned with electric signs and how to select and maintain them, nineteen deal with the possibilities in window lighting, test-proven in attracting customers; fifteen tell how to raise the buy-appeal of goods by effective lighting inside the store, and the last two point out the values of adequate showcase lighting. And it is only on the back cover of this sixteen-page booklet that there appears any direct selling of lighting service by the utility. Here the message is the cheapness of light, 56½ cents buying today the light that cost a dollar in 1924.

Sample Bulbs Get Low-Use Customers Interested

By HOWARD J. CADWELL
Sales Manager Western Massachusetts Electric Company

LIKE all utilities the country over we worry about our small customer problem. Like other companies we hailed "Better Light-Better Sight" as an important step toward its solution, but as we went along we found that most of our customers who responded to the promotion of I.E.S. lamps were among those using more than 25 kw.-hr. per month (the first block of our rates ends at 25). In 1937 31.7 per cent of our customers used less than this amount.

Concentration on low-priced I.E.S. table and Pin-It-Up lamps helped, but progress was slow. Actually, we found a stubborn misconception among low-use customers as to the cost of operating higher wattage lamps which was very difficult to dislodge. So, in February, 1938, we decided to put the cart before the horse, so to speak, and to give every one of our 15,200 customers a free 100-watt bulb, whether he had a lamp scientifically adapted to its use or not. We hoped enough of these low-use customers would try the lamp to realize that the resulting increment cost of improved lighting would be small each month. We were aided here, of course, by the lengthening hours of daylight at this season. We did not regard this free sample lamp idea as new, but were interested in the acceptance and results following an aggressive 2-year "Better Light - Better Sight" activity.

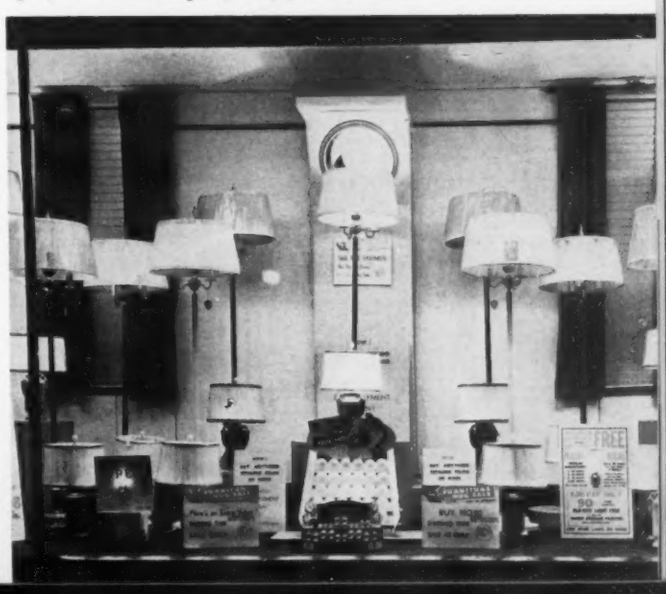
Hard on the heels of the lamp mailing we sent out a survey crew carefully checking results with one out of every 25 customers just as they occurred in the meter books. Here are the high lights:

In use at time of survey (per cent)	57
Average wattage increase per lamp over lamp replaced (watts)	40.7
Average increment rate per kilowatt-hour as against our over-all of 5.21 cents in 1937 (cents)	4.97
Earned annual revenue per dollar of cost of activity	$5.03
Domestic customers using less than 25 kw.-hr. monthly in 1937 (per cent)	31.7
Portion of above group using free 100-watt lamps (per cent)	79.7

The lamps were mailed as samples and for demonstration, but the figures have all the earmarks of permanence. Besides, our small-use customers in general are more receptive to the "Better Light-Better Sight" story. Every mailing carton contained better light publicity and an entry blank for a lighting improvement contest.

This year we wanted to carry the straight lamp bulb story a step further. So we promoted a carton containing two 100-watt, one 75-, two 60- and one 40-watt lamps plus a 7-watt nite-lite, at 90 cents total. This plan was promoted through dealers entirely and without employee campaigns. It was widely advertised and displayed.

Dealers Co-operate—Here is a Sears-Roebuck window display tying in with utility lighting promotion



Sales totaled 1,800 cartons, or 10,800 bulbs plus 1,800 nite-lites. Many dealers gave us fine co-operation. The above activities were also engaged in by the affiliated Pittsfield company. It also has about 15,000 customers and obtained substantially the same results as did Greenfield.

Lighting Advisory Service Facilitates Sales

IN A LARGE MIDDLE-WEST utility the promotional activities of the lighting service department are entirely separate from sales work. That this arrangement produces results is attested by the following information and data:

The figures in the accompanying table of results for the three years just past show a decrease in the 1,938 additional watts recommended per home. There is also a decrease in the average watts installed per home. This is due to the increasing number of I.E.S. type lamps already in homes when adviser enters. The number of recommendations in 1938 had to be increased to offset the decrease in watts installed.

Dealer Contact Important

Because of its "no merchandising" policy the lighting service group must maintain close contact with dealers, jobbers and electrical contractors. Retail training classes for lamp buyers and their respective sales forces were held both in 1936 and 1937. These classes were held one evening a week for four successive weeks. Frequent trips are made to all dealer lamp departments and fixture stores by the advisers as well as supervisors.

Home-lighting demonstrations are given by appointment from September 1 through May to those customers having telephones. The telephone call for a definite appointment is preceded by a mailed announcement of our service. Two telephone solicitors make all appointments for advisers. Those customers not having telephones are contacted during the three summer months by the cold canvass method.

The activities of the lighting service division are in charge of the lighting supervisor. Reporting to him are the assistant supervisor (under him are seven commercial and one industrial salesman), the drafting supervisor (under him are three draftsmen) and the home-lighting supervisor (under her supervision there are 24 home lighting advisers).

The territory served by the company is divided into districts and each salesman is responsible for the customers in his assigned district. Bill complaints and applicants for service, as well as lighting work, are handled by the salesmen. When rate reductions are made the lighting salesman sees the customer, showing him the annual savings effected and how this saving can be used to better the lighting of his place of business.

The drafting division makes surveys and lighting layouts of the customer's premises for the salesman. The completed layout is a blueprint with suggested fixtures and a short story on the value of correct wiring, all bound in a folder. The salesman, relieved of making surveys and the proper lighting layout, can spend much more time in actual selling and attending the service needs of the customers. Here is a summary for 1938 of this phase of the lighting activity:

Calls	Sales	Kw.	Annual Rev.
9,308	1,231	6,204.2	$181,620

Layouts Installed	Compromised	Refused	Pending
418	62	87	151	118

Results from Home Lighting Advisory Service

	1936	1937	1938
Number advisers	20	24	24
Number recommendations	8,625	11,153	12,155
Average additional watts recommended per home	533	519	458
Average additional watts installed per home	307	324	301
Number portables sold	5,175	8,030	7,901
Number fixtures sold	431	780	972
Number bulbs sold	60,375	73,609	69,283
Revenue	$35,969.58	$50,745.63	$42,386.05
Expense	28,872.58	39,836.57	37,778.46
E.A.R. per recommendation	4.17	4.55	*3.48
Cost per dollar E.A.R.	0.802	0.785	†0.891

*Due to rate reduction effective August 1937. If based on 1937 revenue, 1928 E.A.R. per recommendation would be $4.24 per recommendation.
†Cost per dollar E.A.R., $0.732 based on 1937 revenue.

Employees Suggest Lamp Campaign

By E. T. MOORE
Sales Promotion Manager,
Virginia Public Service Company

MOST successful domestic light selling campaign ever conducted by the Virginia Public Service Company was the employee lamp sales activity in the last three months of 1938. The results were: 114,393 lamps sold, 1½ lamps per domestic meter; total wattage sold, 7,270,823, average 63½ watts per lamp, 138 per cent of quota wattage; 12,310 orders secured, 9.9 orders average per employee. More than 10,000 watts were sold by each of 181 employees; reward to each, an automatic pencil. One employee, a meter reader named Vernon Daniels, secured 807 orders for a total of 250,320 watts.

Employees Suggested Campaign

The campaign was suggested by a number of employees who had been missing the extra money they had previously made in sales commissions before the company discontinued merchandising appliances (except lamps) on April 1, 1938. A commission plan was set up to compensate employees at the rate of 50 cents per thousand watts of lamps sold. A quota of 70 watts per domestic customer was established and prizes offered to the district in each division securing the highest quota percentage. Another prize of $5 was offered to the employee in each district who secured the greatest number of individual orders and a sweepstakes prize announced for the largest wattage of lamps sold by any employee.

A kit was prepared for each employee and division meetings were held at which these kits were distributed. Each kit contained a prospectus outlining the campaign, a supply of order cards, a price list, a lapel button and a letter from the president of the company, asking for the employees' co-operation.

The profit on the lamps sold more than paid the cost of this activity. In several of our towns arrangements were made with Western Union to deliver the lamps sold at a flat price per carton and employees did a swell job selling higher wattage lamps under the commission plan offered. The campaign was well timed, since the reduction in price on 75- and 100-watt lamps was made several months previous to our activity.

"Lighting for Revenue"

LOAD BUILDING

Utility Keys Sales to Rate Reduction

Keying sales activity to three progressive rate reductions affecting the top block of the residential rate, Indiana General Service Company has initiated a company-dealer co-operation program which has as its slogan "Invest your electric rate savings in time-saving appliances."

This appliance campaign, which is to be in effect throughout 1939, has three basic aspects. *To the customer* it offers an opportunity to purchase appliances at low prices, at the same time through the rate reductions securing low operating cost for the energy used. *To the electric dealers* by presenting an unusually attractive residential rate and appliance barbains concurrently the campaign offers an opportunity for securing sales volume by urging customers to invest their savings in appliances. *To the company* the campaign offers an opportunity through increased use of appliances to regain, in some degree, the revenue voluntarily surrendered and an equal opportunity to build public good will through assisting the customer to enjoy the more abundant life without increased cost.

The company is providing dealers each month with displays featuring the appliance of the month and with streamers, pennants and giant reproduction of newspaper advertising. In addition, prizes of $20 are offered monthly for the best-decorated window in dealers' stores featuring the appliance of the month.

Monthly meetings for dealers and distributors are being held by the company to sustain interest in the year-'round campaign, with a sales promotion man assigned to this activity to assist dealers in promotion.

Invest your electric rate savings in appliances

On January 1, 1940, Indiana General Service Corporation will be operating on the rate schedule shown here for Scranton Electric. These two companies and Indiana & Michigan Electric Company will essay to regain revenue drop due to rate cuts.

Leaflets describing the various monthly appliance campaigns are being distributed in quantities for distribution through meter readers, company solicitors and cashiers to keep customers reminded of each month's sale. Supplies of these leaflets are being furnished to dealers at no cost. It is being suggested to dealers that they supplement this material with direct mail circulars from their manufacturers for distribution by mail or handed out. Use of special signs on dealers' trucks and cars is also encouraged.

To the dealers who wish to put on additional salespeople for house-to-house canvassing the utility is offering assistance in training groups of such people. Dealers are being urged to use house-to-house canvassers, pointing out the opportunity for sales of appliances and wiring business beyond the appliance offering of the current month.

With dealers, distributors and manufacturers participating in the advertising, display and actual sale of appliances the Indiana General Service Company hopes to be able to attain a load increase with small appliances in domestic service aggregating 2,000 kw.

•

Puget Sound Nursery Yields 2,059 Kw.-Hr.

Remarkably fast blooming of narcissus was recorded at the C. L. Wight nurseries at Woodinville, Wash., recently, when a test was made to determine the effectiveness of a new installation of electrical equipment. The flowers were brought into bloom in twelve days, whereas 28 days is normal.

The greenhouse, which measures 20x50 ft., was equipped with a glass roof, while the remainder of the structure was insulated with Celotex, coated with aluminum paint. Five 2-kw. fan-type heaters were employed, the fans operating continuously, the heaters intermittently by thermostatic control to hold temperature above 50 deg. F.

Further to force growing, twelve 150-watt lamps in aluminum reflectors, placed 4 ft. above the beds, were operated from dusk to 10 p.m.

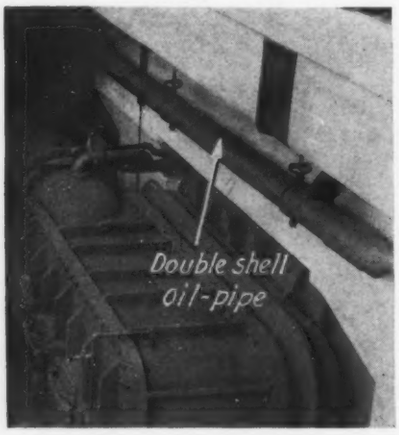
During a month's operation of the entire installation 15,000 blossoms were produced and 2,059 kw.-hr. was consumed. The nursery is served by Puget Sound Power & Light Company.

OPERATING PRACTICES

Welded Sleeve for Double Shell Oil Line

By C. E. MILLER
Engineer, Potomac Electric Power Company
Washington, D. C.

Because there had been serious fires in power stations resulting from lubricating oil leaking on high-temperature steam lines, all pressure piping to bearings is run inside of and spot welded to the top of the welded oil drain lines returning to the reservoir. This type of construction is ideal from a standpoint of safety, but does introduce some difficulties in installation.



Sleeve welds keep scale and welding beads out of turbine oil line

It will be noticed from the illustration that sleeve welds are used in every case to prevent scale and welding beads from being deposited inside the pipe. After the inner high-pressure pipe sleeve is welded this weld can be chipped, wire-brushed and any scale or welding beads removed from the inside of the outer pipe. The sleeve of the outer pipe is then moved into place and the two outside welds made on this joint. In spite of this procedure, a slight amount of oxide will form on the inside of the pipe when welding the sleeve from the outside, but it has been found that this has never been of sufficient quantity to cause difficulty even when starting a unit for the first time. The general appearance of this type of piping with a typical connection and return to an intermediate bearing is also shown.

As a further precaution against oil fires, all oil coolers, strainers and pumps are installed inside the oil reservoir, which in turn is protected by a separate Lux CO_2 fire extinguisher system. This fire extinguisher system is set off automatically from a sudden change of temperature of 20 deg. in the tank.

•

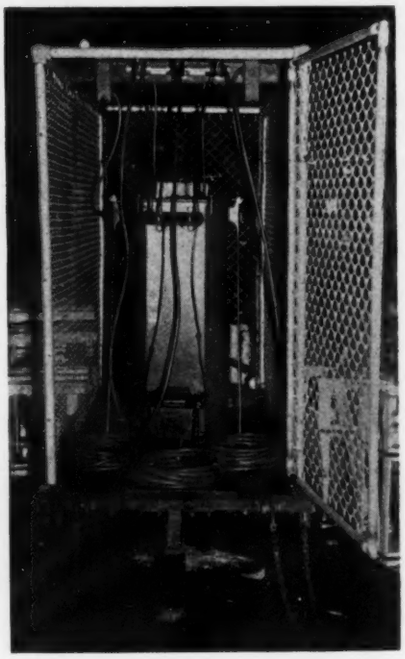
Trailer Transformer for Emergency Service

Several sound reasons can be advanced to justify the cost of a trailer mounted transformer for emergency and maintenance operations. The reasons advanced by the Central Illinois Light Company, Peoria, for construction of such a unit recently are:

Night service men cannot hang a large transformer. Day crews must be called in such emergencies to install the unit on an overtime basis. Night service men can, however, deliver and connect a trailer-mounted transformer, leaving the actual change to be done during regular working hours by the day crew.

Hanging and removal of a temporary transformer during maintenance or transformer changes is eliminated by the trailer unit, which can be hauled out on the system, connected and left till the proper size transformer can be conveniently installed.

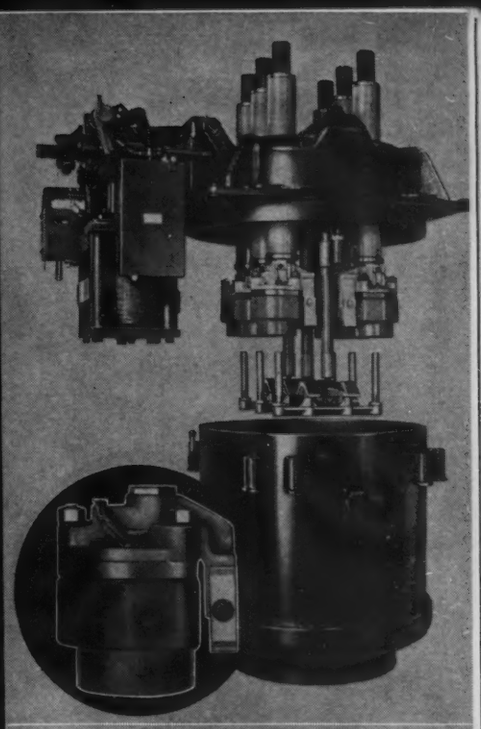
The Central Illinois Light Company trailer transformer is rated 37½ kva., 2,300/115-230 volts. It is installed on a two-wheel trailer and surrounded with an 8-ft. page-wire fence. Primary snubbing insulators, cutouts and a secondary rack are mounted on a crossarm bolted to the fence frame. A 0.6-kva., 110/6-volt transformer connected to the main transformer secondary operates parking lights on the transformer trailer while it is in operation. Six-volt parking lights were used to allow the same set of lights to be used while transporting the trailer. A suitable double



Trailer transformer for emergency and maintenance operations

Note 0.6-kva., 114/6-volt transformer for parking lights on bed of trailer just in front of main transformer.

OUT OF 23 DEVICES CAME "QUICK—QUENCH" RUPTORS!



LABORATORY AND FIELD TESTS prove that Ruptors increase circuit interrupting efficiency. Shown here is a Type DZ-100, 2,000 amp, 15 kv, Oil Circuit Breaker with Ruptor.

And Ruptors Extinguish Arcs FAST! Their "QUICK-QUENCH" Action CUTS Oil Carbonization and Contact Deterioration to a Minimum!

● When Allis-Chalmers engineers set out to design an "ideal" oil circuit breaker for large systems, they were faced with a tough job!

They had to find an interrupting device that would reduce oil and contact deterioration . . . that would eliminate oil throw . . . that would be easy to get at for inspection and maintenance.

Those engineers designed and tested twenty-three separate and distinct devices — and rejected twenty-two of them! The one that stood out . . . that was checked, improved, re-checked, and re-tested . . . was the Ruptor—the one design accepted from twenty-three! And today, thousands of installations have proved that those engineers chose the right device!

That's why you get more "breaks" for your money when you specify Allis-Chalmers "QUICK-QUENCH" Oil Circuit Breakers with Ruptors for your high-voltage systems!

For Ruptors extinguish arcs . . . *fast!* Their "QUICK-QUENCH" action interrupts arcs in split cycles . . . reducing oil carbonization and contact deterioration to a minimum. That's why they can handle more circuit interruptions before inspections and renewal of oil or contacts are necessary.

Maintenance Cost Reduced!

But that's not all you get when you specify Allis-Chalmers. Actually, your maintenance costs are reduced! For Ruptors give you consistent operation without constant attention. And they're easily accessible for inspection and service. They don't waste the time of your maintenance men!

Get all the facts about Ruptors. Find out what these products of Allis-Chalmers engineering and technical experience can do for you. Let your nearest Allis-Chalmers representative give you the whole story on "QUICK-QUENCH" Ruptors . . . high interrupting capacities at a lower cost!

970

SUSTAINED REVENUE! Available with Allis-Chalmers Ruptor-equipped Oil Circuit Breakers, are high-speed reclosing operators, which restore service well within the new NEMA standard. That means outage time is reduced . . . costly, time-wasting service trips to outlying districts are cut . . . revenue is kept up . . . and customer satisfaction is sustained!

SWITCHGEAR DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

METALCLAD SWITCHGEAR • SWITCHBOARDS • OIL CIRCUIT BREAKERS • REGULATORS • MOTOR STARTERS • CUBICLES • SWITCH HOUSES

plug provides a means for connecting the lights to the battery of the tow car during transportation.

•

Trip Arrangement Reduces Standby

By A. G. JOHNSON*
Nebraska Power Company, Omaha, Neb.

Rather than install spare capacity on a 13-kv. spot network, installed to supply the headquarters building of the Union Pacific Railroad at Omaha, when complete air conditioning boosted the building's peak demand from 250 kva. to 1,550 kva., means were provided to trip off some of the air-conditioning load in case of failure of one transformer or a primary cable.

Three 500-kva., 13-kv. network transformers were installed in the sidewalk area in separate vaults having two sidewalk gratings for ventilation.

Circulating fans were also installed to provide additional circulation in the hottest weather.

Each transformer was equipped with a contact-making thermometer, which was connected to a gong and indicating light in the compressor room and through a time-delay relay to the shunt trip on the main breaker for the air-conditioning load. In case one of the transformers should become overheated the gong and indicating light will operate. The engineer in charge notifies the company's load dispatcher and reduces his load to a predetermined value. If he fails to reduce the load or the contact-making thermometer does not open within 30 minutes the compressor load is automatically dumped.

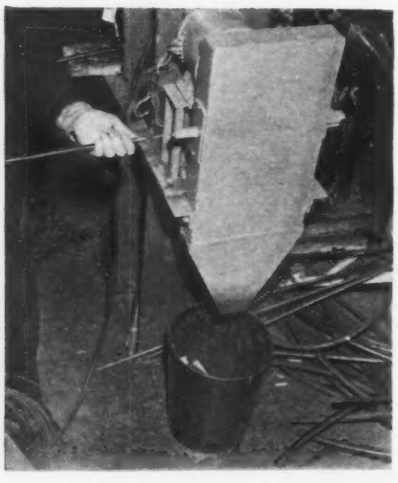
Other factors which lead to the decision to make this type of installation are as follows:

1. Transformers not subject to lightning hazards have a remarkable record for reliability.
2. The transformers are supplied from underground feeders which are short and failures are infrequent. Based on national averages, joint or cable failures can be expected approximately once every three years, which is somewhat more frequent than our experience.
3. The chances of an outage of one of the feeders with its associated 500-kva. transformer at the time of peak load is less than one in 50. Should this outage occur during normal peaks the overload might be nearer 25 per cent, and this would not be serious.

This practice is now being extended to all users of air-conditioning loads of more than 100 kva. The customer is asked to provide means for tripping off the air-conditioning load so that when the network is extended similar provisions may be incorporated.

* Adapted from a recent paper before underground systems committee, Missouri Valley Electric Association.

Machine Skins Insulated Wire



Anybody that has ever peeled the insulation off the end of a piece of wire with a knife knows how difficult it is. This "homemade" machine in the service building of the Buffalo Niagara Electric Corporation takes the insulation off in a manner like a pencil sharpener. The rubber "shavings" fall into the bucket below and are later used in the laboratory to make glue.

Pulls in 3 Miles in Four Hours

Pulling three conductors at once, this winch-equipped Caterpillar Thirty pulls in 3 miles in four hours at 13,500 ft. elevation on the property of the Public Service Company of Colorado at Idaho Springs. It uses less than one gallon of gasoline an hour

Tower Truck for Insulator Washing

For washing line insulators, engineers of the general plant division, Los Angeles Bureau of Power and Light, have designed a special truck, which was placed in service early this year. It is not unlike the tower truck used by metropolitan fire departments, but, in addition, it carries its own water in a 900-gal. tank.

It consists of a ladder on the end of which is a crow's nest for seating the man who operates the nozzle. Another man, at the base of the ladder, controls its position, the ladder being susceptible to elongation to its 72-ft. length, to raising and lowering in an arc, and to traverse through 180 deg. For safety, a second set of controls in the crow's nest enables the nozzleman to cut off all operations. Pump capacity is 37 gal. per minute, and normal operating pressure is 350 lb. per sq.in., but pressure can be raised to 1,000 lb. per sq.in. to attain a water-jet height sufficient to reach insulators on high transmission towers, such as those of the bureau's Boulder line.

Design for quiet operation makes

Wagner Transformers
for Every Type of Service

Whatever your needs may be, the Wagner line of transformers is so extensive in sizes and types that it includes transformers that will exactly fit your system's service requirements. They are modern in construction and designed especially to conform to the latest standards.

OUTSTANDING FEATURES OF WAGNER TRANSFORMERS

Low-Loss Non-Aging Silicon Steel Cores—High permeability, low hysteresis and eddy-current losses.

Advanced Core and Coil Assemblies—All transformer windings have reinforced end-turn insulation and the latest features that will insure long and continuous service.

Copper-Bearing Sheet Steel Tanks—All transformer tanks are formed from rust resisting copper-bearing sheet-steel, thoroughly sandblasted and carefully painted with three coats of durable, weather-proof transformer paint.

Completely Tested—All Wagner transformers are completely tested in accordance with A. I. E. E. and N. E. M. A. standards.

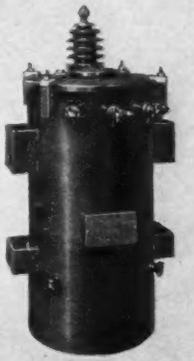
Write for Descriptive Literature

T39-7

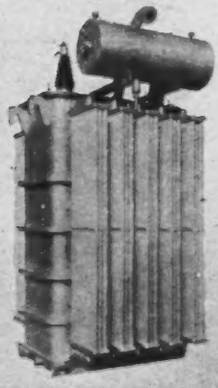
Wagner Stud-Bushing Type Distribution Transformer

Wagner Sub-Station Transformer

Wagner Surge-Protected Transformer



Wagner Rural-Line Transformer



Wagner Power Transformer

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, Mo., U.S.A.

TRANSFORMERS • MOTORS

FANS • • BRAKES

Ladder truck for washing insulators carries water supply too

the unit suitable for working within the city at night, while sand tires and compound gears enable it to operate in desert and mountainous country.

•

Weatherproof Wire and Cable*

Kansas City Power & Light Specifications

IV—Packing and Shipments

Finished wire or cable shall be so packed for shipment that it will be suitably protected from injury. Solid wire will be in coils and stranded cable on reels. Coils shall be marked with size and net weight and shall be of approximate net weight as listed on order. Reels are to be plainly marked with the approximate length and the size of cable and the gross and net weight of same; only one length of cable shall be placed on each reel.

Each coil shall be bound at not less than three separate places, with strong twine and shall be wrapped with paper, burlap, or both, to protect the wire from injury. Wire on reels shall be wrapped with paper, burlap, or both. The total weight of the material used to wrap the wire shall not exceed 1½ per cent of the weight of the wire wrapped.

The reels shall be of good material, substantially made, so as to protect the wire during shipment and handling. The drums shall be of such diameter that the wire will not be injured in any way. The holes through the center of heads shall be round and not less than 2½ inches in diameter.

Acceptance or Rejection — The vendor agrees to furnish the material described herein in full accordance with these specifications, and further agrees that if any of such material is rejected because of failure to meet these specifications, as determined by our stated method of testing, such tests to be made in our laboratory or any other way we may elect, the vendor will assume the actual expense of handling and testing such rejected material, including labor, transportation, demurrage, storage and all other incidental expense, all of such expense being subject to a supervision charge of 25 per cent freight and demurrage excepted.

*The fourth of a series of five covering specifications to get single-conductor wire and cable that can be installed throughout the year and which will give reasonably long service.

Dual Service Demands Totalized at Fair

By KNOX F. BURNETT
Exhibits Engineer
New York World's Fair of 1939

As explained in the article "Sure Power, With Innovations, N. Y. World's Fair of 1939," in the September 24, 1938, ELECTRICAL WORLD, the major exhibit buildings have dual service. In case of failure of either supply part of the load is still served by the independent but overlapping circuits.

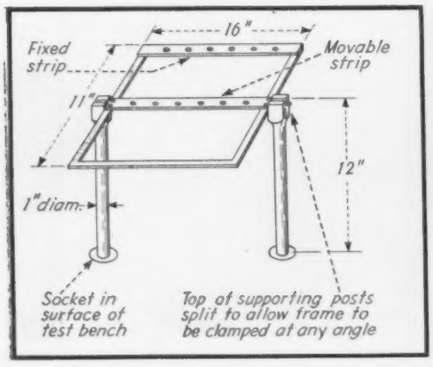
Inasmuch as the rates involve both kilowatt-hour consumption and demand it is necessary to provide totalizing means on such installations.

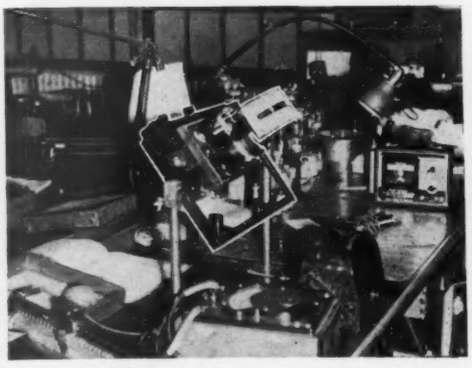
Each 2½-element meter is provided with contacts to generate the impulses which actuate the Westinghouse RA impulse totalizer. In the case of the larger loads the totalizer provides a graphic record of the demand as well as the cyclometer count of the total number of impulses received from the two watt-hour meters. In about 60 per cent of the installations it was found that two-circuit totalizers were found particularly appropriate in conjunction with the CA-8 or VW5a watt-hour meters.

Meter-Mounting Back Makes Testing Easier

For the convenience of instrument men in the meter shop of Central Illinois Public Service Company, Springfield, the company has equipped all benches with adjustable mounting frames on which instruments and relays of any kind can be clamped and readily tilted to any easy working position.

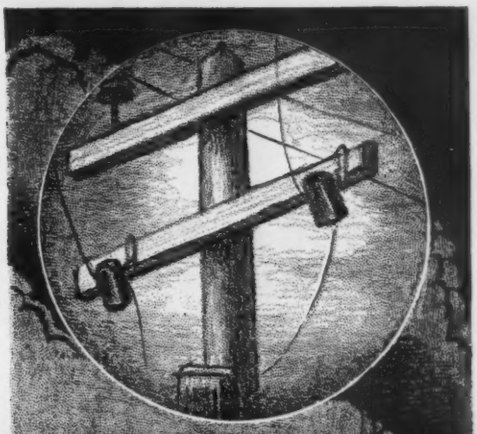
Design of the mounting frame was worked out by the company and is shown herewith. It is a welded 11 x 16-in. frame of ¾-in. angle iron carrying two fibre strips 2 x ½ in., one of which is fixed, the other is movable and can be clamped in any place by means of wing nuts. The frame is mounted on 1-in. diameter posts split at the top to allow the trunnions of the frame to be clamped. The supporting posts are set in sockets flush with the bench top and the entire assembly can be removed from the bench to clear it for other work.





Adjustable bench rack tilts instruments and relays at convenient working angles

UP IN THE AIR ALL CUTOUTS MAY LOOK ALIKE...



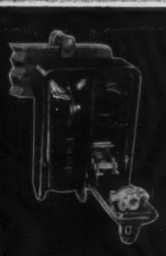
but R&IE ENCLOSED CUTOUTS

HAVE MANY SUPERIOR FEATURES

- Simplified construction, few parts.
- Top and bottom contact assemblies are of stamped copper.
- Replacement very simple if porcelain accidently breaks.
- Uses any universal link, but we suggest the R&IE Thermo-Rupter for they have many inherent advantages.
- HI-PRESSURE CONTACTS (Main spring, beryllium copper)
- Very sturdy hanger, all one-half inch bolts.
- EXTRA HEAVY fibre lined, wrapped bakelite tubes.
- Clamp type terminals.

Write today for Bulletin D-2 containing complete information on Open and Closed Cut-outs, Hook stick and group operated Disconnecting switches and accessories.

Type EKOT



Type REKOT

RAILWAY AND INDUSTRIAL ENGINEERING COMPANY

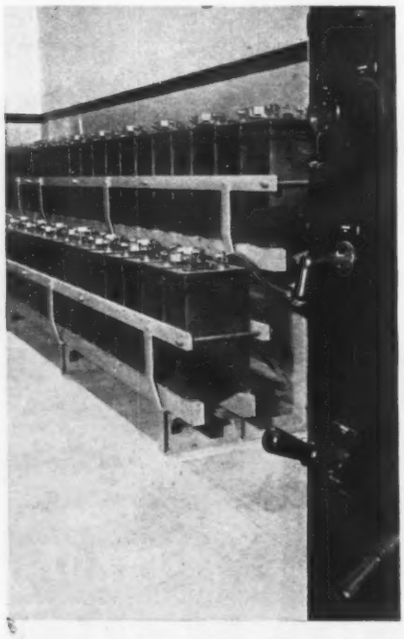
INDUSTRIAL ENGINEERING

Brace Batteries for Earth Movement

In connection with electrifying the San Francisco-Oakland Bay Bridge for trains the Pacific Gas & Electric Company was called upon by the railways to undertake some of the design work on the substations. These three rectifying and switching stations are located, roughly, at the ends and midpoint of the 5.0-mile bridge. All three are operated from the East end substation by the Interurban and the Key System railways by means of supervisory control, the other two stations being normally unattended.

Reliability of the 125-volt-d.c. control circuit is therefore of prime importance. One step in insuring this reliability was the design of an exceptionally rugged rack to accommodate the 60 jars which constitute the installation of chloride accumulator type storage batteries.

Principal members of the rack are made up from structural steel, welded together. The whole is strongly braced, yielding a structure designed to withstand earthquakes having a seismic intensity factor of 20 per cent gravity. This design is expected to give sufficient protection to prevent jars from falling off or bumping together violently enough to break the glass or the electrical connections.



Battery rack designed to withstand earth movements with a seismic factor of 20 per cent gravity

•

Rectifier Solves Change-Over Problem

In the course of a recent change-over from d.c. to a.c. operation at Marshall Field's Chicago store it became necessary to remotor a meat slicer and a meat grinder in the main kitchen. Cost of replacing the existing motors and mounting them with their related control proved to be high enough to justify purchase of a rectifier to supply d.c. to the existing motors from the a.c. mains. The machines had been equipped with a ¼-hp., 115-volt, 3-amp., 1,750-r.p.m. and a ¼-hp., 115-volt, 2.8-amp., 750-r.p.m. motors.

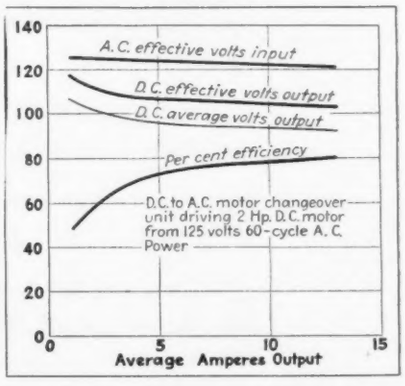
Study disclosed that a new type rectifier designed especially for change-over work and capable of delivering 12 amp. full-wave pulsating current at about 110 volts at an efficiency of 80 per cent could be obtained for about $65. It was installed to supply the old motors.

This rectifier employs a straight bridge circuit with no transformer, aside from a small filament transformer for cathode heating that supplies 104 watts regardless of load. Four Cetron, shielded, hot-cathode, mercury-vapor tubes are used. Voltage drop in the arc of each tube is 5 to 8 volts.

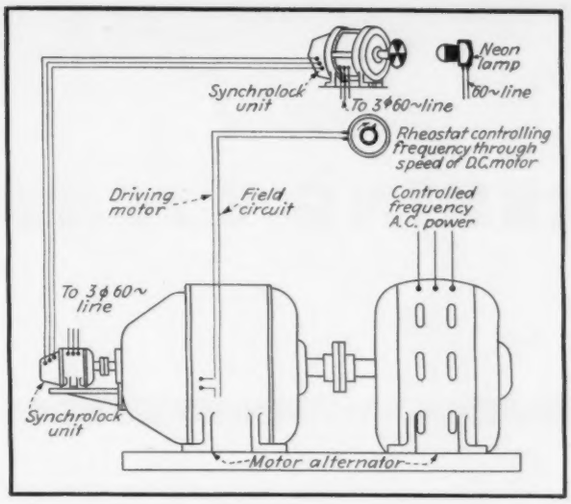
Use of the rectifier in this case had the desired result of permitting the advantageous torque and speed regulation characteristic of the d.c. shunt motors on the machine to be retained.

The rectifier that was used was invented, developed and designed by H. J. McCreary, Chicago.

Rectifier cuts cost of remotoring food machines during change-over



Performance characteristics of rectifier



Two synchrolock units keep sectored stroboscope disk in step with distant alternator

One induction motor coupled to the motor-driven alternator and another induction motor coupled to shaft carrying sectored disk keep their respective speeds identical at all times. Note that the back half of the neon lamp must be taped to block light from the rear disk of the lamp, to avoid getting 120 flashes a second instead of the required 60.

Synchrolocks Control Alternator Frequency

Frequencies ranging from 20 to 90 cycles are regularly required on the a.c. test floor of the Reliance Electric & Engineering Company. Moreover, it is equally essential to hold absolutely constant whatever value of frequency is being used.

These requirements dictated the selection of the stroboscope method of alternator speed determination. But with the equipment under test located some distance away from the alternator set the conventional arrangement of a sectored disk mounted directly on the alternator shaft and illuminated by a 60-cycle neon lamp had to be modified to bring the sectored disk and light to the test stand. This raised the problem of how to keep the disk rotating at the same speed as the alternator, regardless of the voltage of the latter.

In taking full circle data on a.c. motors, the voltage applied to the motors may be as low as one-tenth of normal voltage. An induction motor powered from the alternator could not be used to drive the sectored disk; its slip from synchronous speeds at the very low applied voltages would be too great.

The problem was solved by devising an arrangement of synchrolock units to keep the sectored disk rotating at exactly the same speed as the alternator. Consisting of two wound-rotor induction motors with their rotors connected electrically and their stators excited from the standard 60-cycle shop power lines, the synchrolock is essentially an electrical substitute for a mechanical connection of the drive shafts of the two motors.

With a 60-cycle neon lamp and a six-pole, 1,200-r.p.m., 60-cycle alternator various combinations of sectored disks were used to identify and control a range of frequencies from 10 to 90 cycles. The following are typical examples:

No. of Sectors	Speed of Alternator and Disk (R.P.M.)	Frequency In Cycles
2	1,800	90
3	1,200	60
4	900	45

With the proper disk placed on the shaft of the synchrolock motor, the frequency can be changed and held constant at the new value by adjusting the speed of the driving d.c. motor with a field rheostat until the sectored disk appears to be stationary. Apparent rotation of sectors in the direction of rotation of the disk indicates a higher frequency; rotation in the opposite direction indicates a lower frequency.

•

Plant Change-Over Effected in One Day

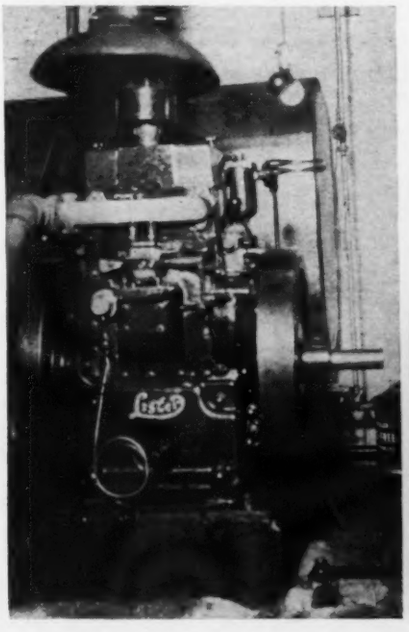
By L. M. DURYEE
Industrial Power Engineer
Connecticut Light & Power Company, Waterbury

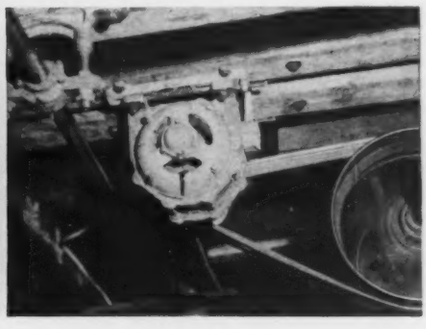
The ease with which purchased power can be installed to take care of Diesel engine failure was demonstrated recently in a Waterbury, Conn,. screw machine plant.

The Bar-Work Manufacturing Company there had used a 14-hp., 1,000-r.p.m. Diesel engine for about 2½ years for all its power. This machine drove the main shaft, to which were belted ten individual automatic screw machines. Last summer repair bills began to mount and engine speed dropped substantially so that production in the plant was seriously impaired.

The owner had been prepared in advance for the trouble by the power engineer of the local utility. So when serious shutdowns began to occur the power company construction crew and the electrical contractor were able to make the three-phase installation in the plant the same day. A new 15-hp., 1,800-r.p.m. squirrel-cage motor was installed on the ceiling to drive the main shaft. With no appreciable loss of time Mr. Villano was operating his newly electrified plant at constant speed and had completely eliminated the interruptions formerly encountered. He has discarded his engine and is now a firm believer in purchased power.

Electrical supply to the company is three-phase, three-wire, 240 volts, 60 cycles, the factory taking 110-volt lighting through its own 2-kva. insulating type lighting transformer.





Squirrel-cage motor replaces Diesel engine in screw machine plant

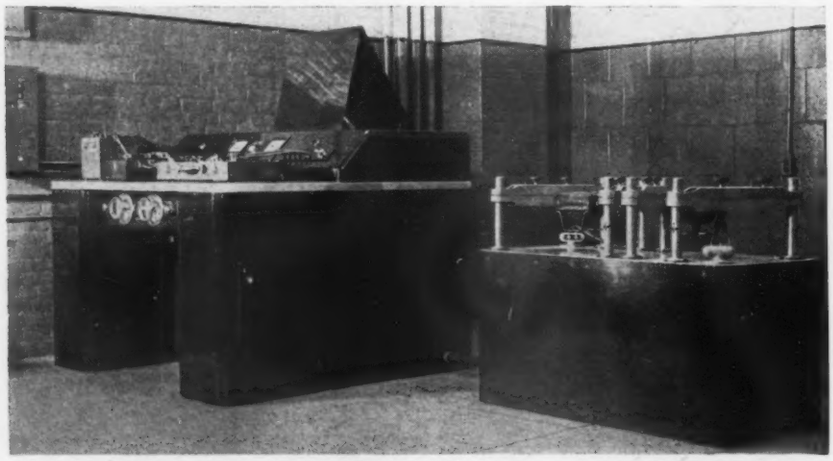
NEW ENGINEERING IDEAS

Safety Features Board for Transformer Tests

Safety features for the testing of potential transformers distinguish a test board for current and potential transformers recently put in service by the Trenton, N. J., district meter department of Public Service Electric & Gas Company. With the use of a phase shifter and Silsbee instruments the new board provides facilities for determining correctness of polarity, phase angle and ratio. Current capacity is from 0 to 2,000 amp. and voltage ratings are 220, 440, 2,200 and 4,400.

Potential transformer to be tested is placed in a compartment at the rear of the operating panel and the inclosing cover of this compartment must be closed before the board can be energized. Current transformers are mounted on the adjacent table containing the current-loading transformers by means of quick connectors.

An elevator for instrument leads is another characteristic of the board, which was designed and built by the Eastern Specialty Company of Philadelphia, Pa., on specifications from the utility.



Safety features distinguish new test board; potential transformer compartment in open position at left, table for mounting current transformers at right of operating panel

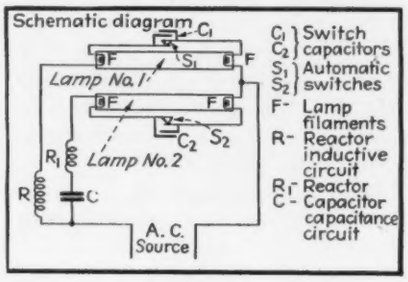
•

Operates Fluorescents at Unity Power Factor

A new fluorescent lamp auxiliary* that will operate two lamps from a single auxiliary in such a manner as to provide approximately unity power factor has been introduced by the General Electric Company. Design of the new auxiliary involves the so-called "split-phase" principle. In one branch of the circuit the predominant characteristic is capacitance and in the other branch inductance. The lamp connected to one branch operates at leading power factor, the lamp in the other branch at lagging power factor—the combination at unity. Two independent thermal switches provide the lamp filament heating and inductive "kick" for starting the lamp. The fundamental circuit is shown in the accompanying diagram.

Advantages of the new type auxiliary are:

1. It has 95 to 100 per cent power factor without use of external capacitors and will overcome difficulties arising from low power factor loads.
2. Stroboscopic effect from the lamp is largely reduced.
3. Less weight than two auxiliaries including capacitors for power-factor correction in either magnetic or thermal switch type auxiliaries.
4. More economical, due to lower installation costs and the fact that price is comparable to that for two auxiliaries of the thermal switch type with capacitors for power-factor correction.
5. It will fit standard wireway or above or beneath one lamp in a fixture.



New auxiliary operates two fluorescent lamps at unity power factor using "split-phase" circuit

The new auxiliaries are in two sizes for operating two 15- or two 20-watt lamps from a 110/220-volt source with an approximate loss of 8 watts. Assembly is contained in an oval steel housing of the same cross-sectional dimensions as other oval steel cases.

A third auxiliary of this company operates the 30-watt, 36-in. lamp on 120-volt circuits only. Using a thermal switch, it has a leading power factor of about 80 per cent and a wattage loss of about 6.

*See "Electrical World" October 22, 1938, page 64, for description of other types of auxiliaries for fluorescent lamps.

A Ready Market - - -

The basket of apples, that carries the label of the "Hill Top Orchards", always has a ready market —because the market has learned that the label is a symbol of the cream of the crop. . . . Likewise, the "Chromel" label, on a spool of resistance wire, means to the heating appliance maker that his heating-elements will be right. He gladly entrusts the reputation of his own product to what he *knows* about Chromel. This is the original nickel-chromium resistor that created the appliance industry, which has come to know that Chromel is a good name in heating-element wire. . . . Hoskins Manufacturing Company, Detroit, Mich.

The Wire That Made Electric Heat Possible

CHROMEL *Wire*

A GOOD NAME IN HEATING ELEMENT

Air-Blast Breakers Control Recovery Volts

By G. E. JANSSON and H. W. MARTIN
Allis-Chalmers Manufacturing Co., Boston Works

By correlation of air pressure, port area, series breaks and resistors, air-blast circuit breakers can be designed to meet practically any set of system characteristics over a wide range of interrupting capacity and even above 150 kv. Adoption of a resistor automatically inserted in the circuit by the action of the arc itself provides control over the rates of voltage rise across the arcing contacts after interruption. Instead of having to cope with rates of rise dependent on the natural frequency of the circuit, the oscillations are smoothed out so that the rate of rise of dielectric recovery between contacts exceeds the rate of recovery potential rise.

Without parallel resistors, potential peaks rise to full magnitude. With a circuit of high natural frequency, an exceedingly rapid rate of recovery voltage rise occurs. If, then, the rate of dielectric recovery produced by the air blast cannot prevent reignition, the introduction of a parallel resistor in the arc circuit solves this problem through insuring a positive control over the rate of rise of recovery voltage.

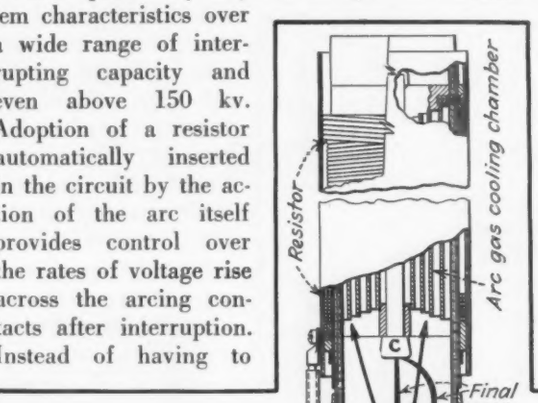


Fig. 1—Cross-section of breaker showing resistor mounting

When the breaker is interrupting the circuit, air under pressure is admitted to interrupting chamber. Piston (3) with disconnect stationary contacts (4) moves, separating contacts A and B, drawing arc which is centralized and extended by air blast to electrode C. As fault current decreases after its maximum in first half-cycle, the arc resistance rises rapidly and the current tends to follow alternative path from (4) through the resistor in series with the arc section between C and B. Arc section A-C becomes unstable and goes out. Arc section C-B continues momentarily with fault current greatly limited by the resistor in series with the arc. This prevents high-frequency transients, absorbs major portion of stored energy in system and limits the rate of rise of recovery voltage between A and B. When the arc C-B goes out at or near current zero, due to air blast, power-factor improvement occurs due to the series resistance. This limits the rate of recovery voltage rise after final interruption.

The resistor is non-inductively wound around the outside of the arc-cooling chamber and rigidly insulated from the latter.

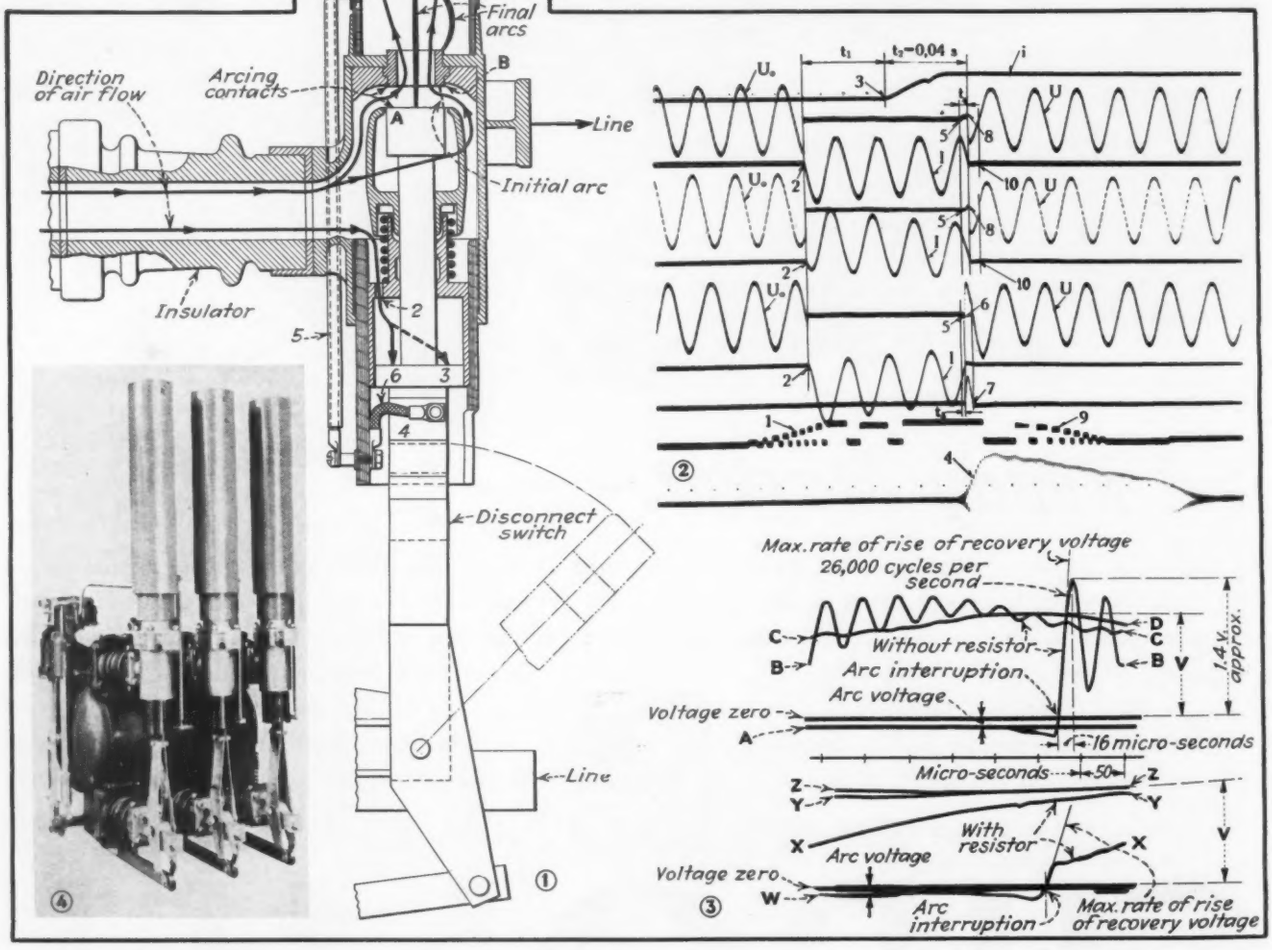


Fig. 2—Breaker interrupting test oscillogram

(1) disconnect contacts close; (2) short starts; (3) trip coil energized; (4) air pressure (135 or 225 lb.) rises in interrupting chamber; (5) contacts separate; (6) point of interruption of current in first phase interrupted; (7) point of interruption of current through resistor in first phase interrupted; (8) interruption of shorts in phases 2 and 3; (9) disconnect contacts open; (10) point of interruption of current through resistors in phases 2 and 3.

t_1=relay time; t_2=interrupting time; t_3=arcing time, first phase interrupted; t_4=arcing time, second and third phases interrupted.

i=breaker coil trip current; U=voltage; I=short-circuit current.

Fig. 3—Cathode-ray oscillogram showing prevention by resistor of high-frequency transients

Upper section, without resistor, shows transient with frequency of 26,000 cycles. Drum speed 150,000 r.p.m. Record starts at A, continues to B, reappears at B (left), continues to C, reappears at C (left), terminates at D. Arc voltage decreased to zero from peak value at interruption point. High-frequency transient appeared, voltage reaching 1.4 times normal maximum sinusoidal value in the short time of 16 m.s. Oscillations gradually decrease to D.

Lower section, with resistor, record starts at W. Resistor limited voltage peak before arc interruption. Rate of recovery voltage rise greatly reduced after interruption. Voltage wave rise rate tapered off, following approximately sinusoidal form through X and Y to Z. Maximum voltage value not reached until 750 m.s.

Fig. 4—750,000-kva., 15-kv., indoor air-blast breaker with resistors

COMPLETELY NON-RUSTING

Long life on long spans demands a high strength conductor in which both the strength wire and conductor wires are completely non-rusting. The Copperweld strength wire used in all Copperweld-copper conductors has *all* the enduring life of the solid copper conductor wires — a completely non-rusting combination.

VIBRATION-REDUCING 3-WIRE STRAND

The stranded triangular 3-wire shape of Copperweld-copper conductors reduces vibration by *inherent* soundness of design. The unsymmetrical shape of the three stranded wires disrupts and balances wind eddies—that's why Copperweld-copper conductors have little or no tendency to vibrate even when strung on long spans with high stringing tensions.

SIMPLE INSULATOR TIES

The *inherent* vibration reducing characteristics of Copperweld-copper conductors eliminate the need for accessories or reinforced ties at the insulators. Copperweld-copper conductors are tied in with a simple annealed tie wire—one piece of wire to a tie—and the tie can be made in two minutes.

Visit the Copper & Brass Industry Exhibit in the Metals Building, New York World's Fair — 1939.

©N. Y. W. F.

COPPERWELD STEEL CO. GLASSPORT PA

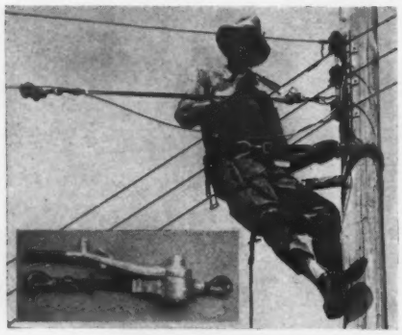
COPPERWELD-COPPER

The High Strength Conductor

NEW EQUIPMENT

Line Puller

Light and telephone wires may be pulled with this line puller. It is built on the ratchet principle and contains 12 ft. of steel pull tape with a tensile strength of 2,000 lb.



"Lite Line Puller;" weighs 5 lb., rated capacity of 400 lb., factory-tested to 100 per cent over rated capacity. **Coffing Hoist Co.**, Danville, Ill.

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Wall Lamps

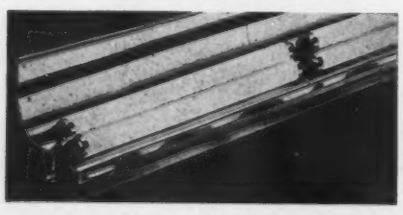
"Wallamps" with "Stay-Straight" feature. **La Salle Lighting Products, Inc.**, Buffalo, N. Y.

New line of this company's wall lamps is equipped with "Stay-Straight" hangers; attached to the wall with two screws, the hanger is concealed when the lamp is hung in place and prevents the lamp from slipping into a lop-sided position when turned on and off. Feature makes possible lamps with pull chains instead of switches.

•

Fluorescent Fixtures

Two-lamp reflectors of specular Alzak aluminum are recent additions to this company's line of fluorescent lighting fixtures. Symmetric and asymmetric styles are offered; coupling clips at the end of the reflectors permit them to be fastened together for greater rigidity in continuous installations.



Two-lamp channel reflectors; asymmetric style shown; for 18-, 24-, 36-, and 48-in. lamps in parallel, T-8 or T-12 size. **Day-Brite Lighting, Inc.**, St. Louis, Mo.

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Vibrator Inverter

Vibrator inverter. **General Electric Co.**, Schenectady, N. Y.

Applications in fluorescent lighting for railway cars and short-wave broadcast radio are seen for a new vibrator inverter for converting d.c. to a.c., described at the recent summer and Pacific Coast convention of the A.I.E.E. Longer life and increased power are claimed for the unit, which is said to eliminate arcing when the contacts separate. Providing an almost constant frequency of 60 cycles, it is said to eliminate the need for the lamp regulator previously needed for tungsten lamps on railway cars.

•

Motor Controls

Heavy-duty push-button unit; "De-ion" motor starters, in two sizes: for motors up to 2 hp. and for motors up to 7½ hp. Dept. 7-N-20, **Westinghouse Electric & Mfg. Co.**, East Pittsburgh, Pa.

New motor control devices announced by this company include a new heavy-duty push-button unit, an improved design of wide flush plate mounted push button and new manually operated across-the-line starters. Push-button apparatus consists of double-pole, double-throw unit for heavy-duty push-button stations; it has four contacts, two on each side of the button. Motor starters indicate "on," "off," or "tripped" position by indicating toggle switch recessed within cover. Snap-action bimetal disk gives overload protection. Trip-free, it disconnects the motor from the line before heat can damage the windings.

•

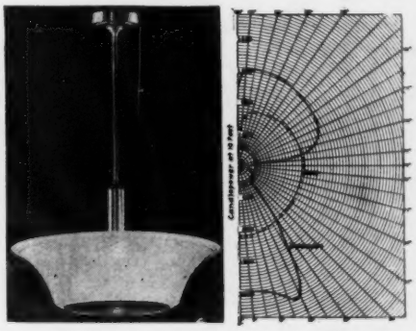
Electric Strip Heater

Electric strip heater for use with ¾-ton room cooler; in 220-volt a.c. and 230-volt d.c. styles, 1,500-watt capacity; for use with self-contained thermostatic control. **Carrier Corp.**, Syracuse, N. Y.

To adapt the portable room air conditioner to year-around service, this company has developed an electric strip heater. With the heater added, the room cooler will use the air filtering, circulation and ventilation features to distribute warmed air throughout the room.

Direct-Indirect Light

Instead of louvers, this direct-indirect lighting fixture uses a Fresnel-type lens to give a wide distribution of down light on the working plane without glare. Elimination of louvers is said to permit a wider distribution of the down light and a stronger down light as well, since there is no absorption of the light by louvers. Plastic bowl is used.



"Directalite;" in close-up and suspension types, to take 200-300-, 300-500- and 750-1000-watt (suspension style only) lamps. Distribution curve for 500-watt unit. **Chase Brass & Copper Co.**, Waterbury, Conn.

•

Line Truck

Offered for line construction and maintenance work, this cab-over-engine truck is equipped with a 10-ft. body with lockers; a winch operating in the five forward and the reverse speed of the transmission; a pole derrick for raising poles up to 40 ft. long. Two men may be seated in the cab; additional accommodations are provided by removable seats along each side and at the front within the body. Full-sliding rear window gives the operator an unobstructed view of the winch in use.

Model "HS" utility truck; 126-in. wheelbase; 85-hp. engine. **The Four Wheel Drive Auto Co.**, Clintonville, Wis.

HE WOULD HAVE BEEN AS INVULNERABLE AS HUBBARD DOUBLE-DIPPED HOT GALVANIZED POLE LINE HARDWARE—GUARANTEED COMPLETELY COVERED WITH SMOOTH, HEAVY NON-POROUS ZINC COATING.

HUBBARD AND COMPANY

PITTSBURGH . . . OAKLAND . . . CALIFORNIA . . . CHICAGO

"HANG THE LOAD ON HUBBARD HARDWARE"

Motor Drive

To protect the equipment it drives from jamming or becoming overloaded, this unit shuts off the motor automatically and instantly when the load exceeds a predetermined value. As soon as the excessive load is removed the unit is ready to start without resetting. When excessive torque is

"PlaneTorque MotoReduceR;" for horizontal or vertical drives, ½ to 75 hp., clockwise or counter-clockwise rotation or both. **Philadelphia Gear Works,** Philadelphia, Pa.

imposed on the output shaft of the unit the increased torque required to rotate the planet gears on the output shaft spider transmits a higher torque to the internal gear held in normal position by a lug and heavy spring. When torque on the internal gear exceeds the predetermined limit the torque spring is compressed, moving the lug and actuating the switch at the top, which disconnects the power.

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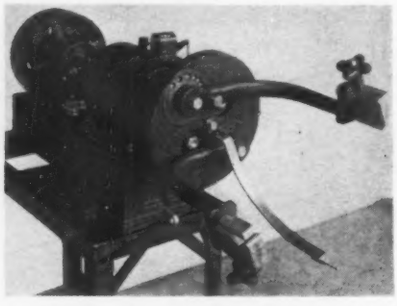
Armature Winding

Armatures may be wound faster and neater with this armature winding yoke, says the manufacturer. Jaws on the end of each of the adjustable arms clamp the armature in position. Wires are guided



"Ideal" armature winding yoke mounted to the "Ideal" coil winder drive; yoke accommodates armatures with shafts from 9 to 19 in. long. **Ideal Commutator Dresser Co.,** Sycamore, Ill.

into the slot by hand, so armatures may be wound in a lathe or coil winding machine. The third arm is used to form the loop after winding each coil, by twisting the wire around the steel pin before starting the next coil.

•

Welding Accessories

"Hardweld 50" electrode, 3/16 and ¼-in. rod sizes; "Surface-weld A" hard-surfacing powder. **The Lincoln Electric Co.,** Cleveland, Ohio.

Medium carbon steel electrode is announced for the building up of steel parts and surfaces. Deposit is said to have considerable resistance to deformation and wear and to be machinable at slow speed. The fine-grained alloyed powder is for application with carbon arc to give a smooth, dense, hard (abrasion-resistant) surface; it can be applied in a very thin layer if desired.

•

Industrial Truck

This center control truck is the first of a new line for this company, which has previously offered end control types. It is built either as a telescoping or non-telescoping truck for inside car work or for high tiering of pallet loads in a warehouse. New type of trail or rear axle carries frame on spring system, providing for a third point support to assure floor contact for two trail wheels and two drive wheels ahead. Other features include carbon mill-type electric contactor, electric cut-out devices for fork carriage travel and tilt limits. Series-wound motors carry 500 per cent overload ratings.

Type "F-16" center control truck; capacity, 4,000 lb., 72,000 in.-lb.; 2- to 5-hp. drive motors, 1- to 3-hp. tilt motors; ram and fork styles. **The Elwell-Parker Electric Co.,** Cleveland, Ohio.

•

Thermometer Wall Plate

Thermometer wall plate for standard flush tumbler switches. **The Arrow-Hart & Hegeman Electric Co.,** Hartford, Conn.

New wall plates have a thermometer recessed at the left side to show room temperature at each switch.

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TECHNICAL BULLETINS

CABLE OPERATION—Performance of high-voltage cables, joints and potheads during 1937 is taken up in Publication No. F16 of the Edison Electric Institute. Causes of failures are analyzed and an appendix gives data as collected by the Electrical Testing Laboratories on cable failures and removals. Copies are available from the E.E.I. headquarters, 420 Lexington Ave., New York, N. Y., priced at $1.50 to non-members in the United States.

PROTECTIVE RELAYING—"The Art of Protective Relaying", General Electric Company's publication GEA-2558 devotes almost all of its 52 pages to an engineering discussion of the ways and means of protective relaying. Protection of a.c. and d.c. rotating machines, lines, mercury arc rectifiers and transformers is considered with respect to general practice along these lines. A convenient set of tables summarizes the salient points. Copies may be secured from Schenectady, N. Y.

STEAM TURBINES—Comprehensive information on the application and selection of steam turbines is contained in a new 48-page booklet announced by Westinghouse Electric & Mfg. Company. Covering the seven principal types of turbines in sizes up to 10,000 kw., this booklet includes charts and diagrams to assist in the economical use of steam and production of power. Both a.c. and d.c. generators, as well as exciters and reduction gears, are covered. Copies of "B.2198" may be obtained from Dept. 7-N-20 of Westinghouse, East Pittsburgh, Pa.

BUILT-IN LIGHTING—"In-Built Lighting through Holophane Controlens" is considered in a publication of the Holophane Co., Inc., 342 Madison Avenue, New York, N. Y. Application of the units to general, local and general plus local lighting is discussed and specifications, application, installation methods, performance and distribution curves are presented for the various units in the line.

INDUSTRIAL LIGHTING—The Illuminating Engineering Society has released "Recommended Practice of Industrial Lighting," including tables of recommended minimum standards of illumination for various types of industrial interiors, in addition to discussion of such allied problems as advantages of good illumination, factors of good illumination, maintenance of illumination, natural and artificial lighting and a statement on adequate electrical wiring. Copies may be secured from I.E.S. headquarters, 51 Madison Ave., New York, N. Y., at 20 cents each.

NOISE MEASUREMENT—To provide basic information and to serve as a guide in the measurement of apparatus noise, the American Institute of Electrical Engineers has issued publication No. 520, "Test Code for Apparatus Noise Measurements." General considerations in apparatus noise measurements, ambient sound levels, instrument standards, factory tests, standard factory measurement positions and field investigations are topics discussed. Booklet is available from the A.I.E.E., 33 West 39th St., New York, N. Y., at 30 cents a copy.

N.E.M.A. STANDARDS—Two new standards—Fan Motor Standards, Publication No. 39-56 and Manufactured Electrical Mica, Publication No. 39-55—have been published by the National Electrical Manufacturers Association. Fan standards cover desk and bracket, ceiling, ventilating and air-circulator types and include information on ratings, performance requirements, general guarantees and manufacturing practice. Copies are priced at 10 cents each. The mica standards supersedes a previous publication printed in 1933. Classification, composition, tolerances and properties of manufactured mica are considered. Copies are priced at 25 cents each. Both standards may be secured from N.E.M.A. headquarters, 155 East 44th St., New York, N. Y.

PIPE AND PIPING MATERIALS—Eighteen specifications of the American Society for Testing Materials covering steel materials for high-temperature and high-pressure service are compiled in convenient form in "A.S.T.M. Specifications for Pipe and Piping Materials for High-Temperature and High-Pressure Services." Carbon-steel and alloy-steel pipe and tubing, castings, forgings and boltings for central station power plants are included. Copies of this 135-page publication may be obtained from A.S.T.M. headquarters, 260 South Broad St., Philadelphia, Pa., at $1.25 a copy.

PRICE

Type 544-B Megohm Bridge ....A-C operated....500 Volt Supply

$235.00

Let us tell you about this new G-R instrument which is essential in every generating station

Write for Bulletin 459

Determining Generator Leakage

IT IS NOW generally recognized that a single measurement of the insulation resistance of electrical generators gives no true indication of generator leakage. The value of insulation resistance can be obtained only by a series of measurements taken at increasing time intervals over a considerable period of time. From these resistance-time curves a true value of the insulation resistance may be obtained.

The G-R Type 544-B Megohm Bridge and its new 500-volt power supply is the ideal instrument for obtaining resistance-time curves of any generator. Its features are:

A-C OPERATION—portable (25¼ lbs)—no bulky dry batteries—no hand cranking of generator

WELL REGULATED POWER SUPPLY—vacuum-tube stabilized (very important when testing large generators with high winding capacitance)

TEST VOLTAGE AT 500 VOLTS D.C.—the standard voltage for measurements of this type

EXTREMELY WIDE RANGE—up to 100,000 megohms—will measure the best of generator insulating materials

GENERAL RADIO COMPANY CAMBRIDGE MASSACHUSETTS

NEWS ABOUT PEOPLE

M. W. Arthur New President of Michigan Association

M. Wilson Arthur, vice-president and assistant general manager of the Consumers Power Co., was elected president of the Michigan Electric Light Association at the annual convention, held recently at Mackinac Island. A native of Charlotte, N. C., and a graduate of Clemson A. & M. College, South Carolina, Mr. Arthur took an engineering apprentice course in the Westinghouse Electric plant at East Pittsburgh. In 1913 he became sales engineer for Westinghouse at Cincinnati, Ohio.

After five years in this position Mr. Arthur was appointed superintendent of sales for the Northern Ohio Power & Light Co., now the Ohio Edison Co., at Akron and in 1926 became superintendent of sales and distribution for that utility. Three years later he was called

Blank & Stoller

to New York City as assistant to the vice-president of what is now the Commonwealth & Southern Corp. and became a vice-president and director of Ohio Edison, Pennsylvania Power Co., Akron Transportation Co. and Penn-Ohio Coach Lines.

In 1933 Mr. Arthur went to Jackson as vice-president and assistant general manager of Consumers Power Co., succeeding Dan E. Karn, who had replaced the late C. W. Tippy as vice-president and general manager.

•

▶ DR. H. J. MACLEOD of the University of British Columbia has been appointed technical adviser to the British Columbia Public Utilities Commission.

▶ LINCOLN BAYLIES, formerly assistant treasurer of the Naumkeag Steam Cotton Co., Salem, Mass., has joined the New England Power Service Co., Boston, as rate engineer.

▶ V. L. SMITHERS of Akron, Ohio, has been appointed commissioner of the National Battery Manufacturers Association, succeeding W. J. Parker, resigned. Mr. Parker, who had served as commissioner for twelve years, resigned to devote his entire time to the organizing and managing of National Trade Associations, which will be carried on through W. J. Parker, Inc., New York.

▶ F. H. MURPHY, electrical engineer with the Portland General Electric Co., Portland, has been appointed by Gov. Charles A. Sprague to the board of engineering examiners of the state of Oregon to succeed F. D. Weber, who retired from the board at his own request after 20 years of service. To succeed Mr. Weber as president the board elected S. H. Graff, mechanical engineer of Corvallis.

▶ PIERCE G. ELLIS, for the past 2½ years a member of the rate department of the Wisconsin Public Service Corp., at Oshkosh, has been appointed budget engineer. Mr. Ellis will report to C. E. Kohlhepp, vice-president and controller, and his headquarters will be in Milwaukee. He will have charge of both operating and construction budgets and in that capacity will endeavor to promote co-ordination of the operating construction plans for the future. Mr. Ellis has been associated with the Wisconsin Public Service Corp. since 1936.

Royer Elected President of Northwest Association

J. E. E. Royer, who recently was elected president of the Northwest Electric Light and Power Association, completed 31 years of service with the Washington Water Power Co. last October. He is at present vice-president and general manager.

Starting work with construction crews, he engaged in maintenance of power stations and substations. Then he was assigned to the light and power

department, subsequently becoming a load dispatcher. In 1913 he was appointed chief system operator and in 1917 operating engineer. After serving as assistant superintendent of light and power he was transferred to the executive department, then serving successively as assistant general manager, general manager, and in 1932 vice-president and general manager.

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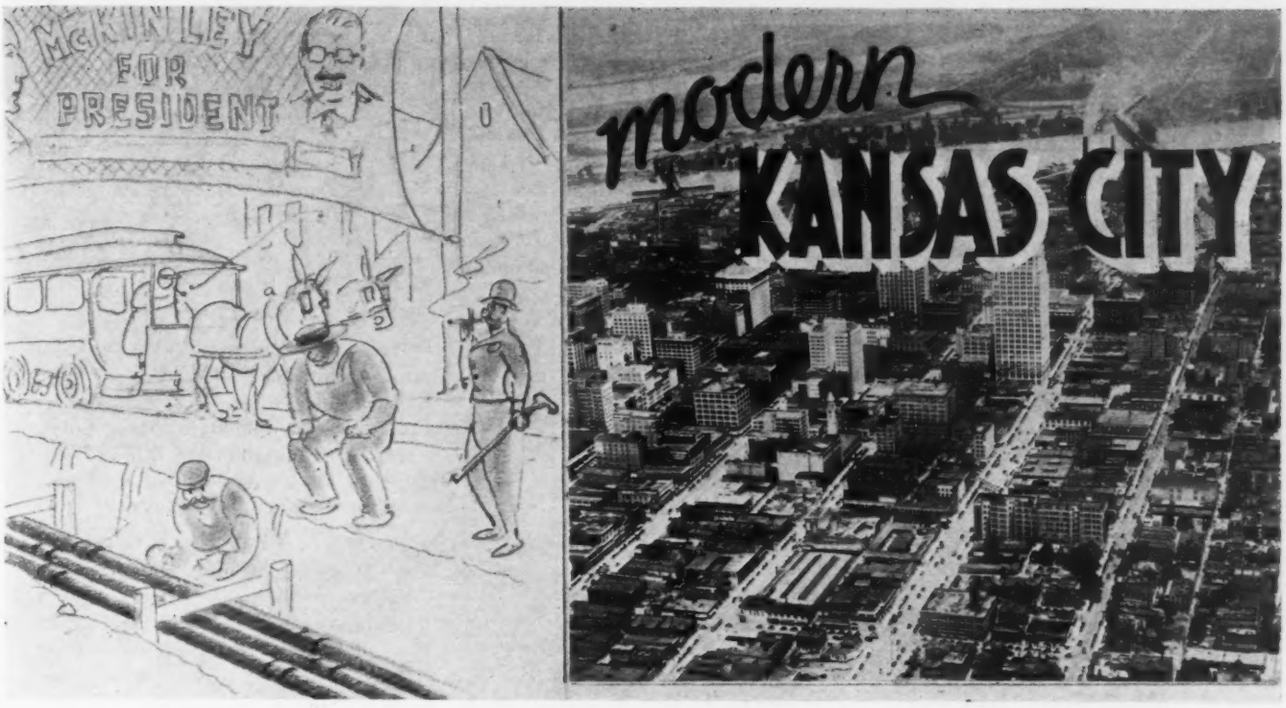
▶ G. A. LOUDEN, for many years manager of the Tarpon Springs district of the Florida Power Corp., has been appointed manager of the Clearwater district in addition to his former duties. His new headquarters are in Clearwater.

ORANGEBURG HAS *long* BEEN PART OF



© Fairchild Aerial Surveys, Inc.

Livestock, grain, oil, farm, dairy and industrial products of wide variety have contributed to the expansion of Kansas City, gateway to the West,—requiring an equally consistent program of forehanded utility expansion . . . and the best of underground distribution systems.

ECONOMY

Orangeburg costs less: Added to the ultimate economies of the finest cable protection money can buy are immediate savings in "material costs" and larger, still, savings in "installation costs" on the final cost sheets of every project.

Just another of the many Orangeburg "points that count."

Orangeburg, trademark, is a guarantee of the best of Fibre Conduits, a time-tested enduring "service" of cable protection *wherever electrical raceway facilities are to be installed underground.*

● Way back in '93 . . . when "Little Egypt" was the sensation of the original Chicago World's Fair . . . Orangeburg was building fibre conduit for cable protection underground. Early Orangeburg installations . . . nearly half a century later . . . still provide 100% trouble-free service.

Orangeburg Conduits of today are the result of a deliberate plan to produce the finest conduit that research and continuous product improvement make possible, for the lowest ultimate costs of underground distribution facilities.

For installation underground WITH CONCRETE ENCASEMENT: Orangeburg STANDARD FIBRE CONDUIT is recommended for duct banks (4 ducts and over), main distribution, high tension and "downtown" locations.

For installation WITHOUT CONCRETE ENCASEMENT, the Orangeburg dual-economy NOCRETE conduit is recommended for service entrances, extensions, parkways and street lighting, suburban distribution, laterals, signal systems, etc.

Sales Agent—Distributors

GENERAL ELECTRIC SUPPLY CORP.

GRAYBAR ELECTRIC COMPANY INC.

MADE AT ORANGEBURG, NEW YORK
BY THE FIBRE CONDUIT COMPANY
292 MADISON AVE., NEW YORK CITY

ORANGEBURG *Standard* for installation *with* concrete encasement
NOCRETE for installation *without* concrete encasement

W. H. C. Smith Retires After 40 Years Service

After almost 40 years of service with the General Electric Co., devoted to wire and cable activities, W. H. C. Smith retired on July 1 from the construction materials sales division at Bridgeport, Conn. At the time of his retirement, and for the past three years, he was assistant to J. H. Crawford, manager of the division. A pioneer of the

industry, Mr. Smith began his association with General Electric in 1900 in the supply department at Schenectady, the forerunner of the present construction materials division at Bridgeport. In the course of the next twenty years he became a cable specialist.

In 1923 Mr. Smith went to Bridgeport as manager of wire and cable sales in the merchandise department. During the ensuing years many improvements in the design of electrical conductors took place and he was closely associated with most of these changes. For many years he was a member of the building wire group of the National Electrical Manufacturers Association and served as chairman of the group, as well as on the advisory committee of the approved cord movement.

•

▶ E. W. FLENTJE, manager of the Iowa Public Service Co., office at Sheldon for the past eight years, has been made superintendent of distribution of the western division with headquarters in Storm Lake.

▶ H. C. MCDANIEL, formerly engaged in lighting engineering for Middle West and Pacific Coast public utility companies, has joined the commercial engineering staff of the lamp division, Westinghouse Electric & Manufacturing Co., at Bloomfield, N. J. Shortly after graduation from Oregon State College in 1926 Mr. McDaniel became affiliated with the Pacific Power & Light Co. at Portland, Ore. He has specialized in lighting since 1928. In 1934 he left the Pacific Coast to become manager of lighting sales for the Central Illinois Public Service Co. He served for four years in that capacity, then in early 1938 he was named supervisor of appliance sales.

▶ CARROL A. OLIVER, formerly engineer of the Belmont municipal light department, has been named assistant manager of the organization. He was formerly connected with the Blackstone Valley Gas & Electric Co., Pawtucket, R. I., and has been acting assistant manager for several months at Belmont.

OBITUARY

E. D. Bell

Edgar D. Bell, vice-president and general manager of the western district of the Kansas Power & Light Co., Abilene, died suddenly, of coronary thrombosis, on June 28 in Florence, Kan., where he had gone on business. Mr. Bell was 64 years of age. He had been associated with the public utility industry in the Middle West since 1901, the year in which he was graduated from the University of Illinois.

Starting with the Urbana Light, Heat & Power Co., in 1903 he was transferred to Danville, Ill., as transmission superintendent. Subsequently he became general manager of the St. Louis Electric Terminal Railway Co. After serving as head of the Champaign division of the Illinois Power & Light Corp., he went to Abilene, Kan., in 1927 as vice-president and general manager of the United Power & Light Corp. (of Kansas) which became a part of the Kansas Power & Light Co. in 1935. Mr. Bell was active in the old National Electric Light Association, having served as president of the Middle West division in 1922.

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▶ LEO G. GIANINI, illuminating engineer, was found dead in his home in San Francisco on July 2. Well known for his work in the lighting field, most recently at the San Francisco Fair, he was in 1930 awarded the Charles A. Coffin Foundation prize for outstanding achievements. Mr. Gianini was born in San Francisco 40 years ago and was graduated from Stanford University in 1921. It was he who established the illumination course at Stanford, and he was a lecturer there at the time of his death.

▶ W. A. TURNER, secretary-treasurer of the Paris (Tenn.) Board of Public Utilities, died at his home in that city last month.

▶ JOHN M. SCOTT, formerly secretary-treasurer of the Wilmington Gas & Electric Co., died June 9, at the age of 66. He became ill on board ship in April when he was returning from a trip to South Africa.

▶ WALKER REID for the past fifteen years connected with the radio transmitter department of the General Electric Co., died in the Albany City Hospital, Albany, N. Y., July 16. He was 54 years of age. A graduate of Cornell University, Mr. Reid was associated some years ago with the Gadsden development of the Alabama Power Co.

▶ LEONARD C. HEALY, for the past 22 years manager of Utah Power & Light Co. at Magna, died recently, while at his desk.

▶ HAROLD E. WHITNEY, 53, director and attorney for the Bellows Falls Hydro-Electric Corp., Connecticut River Power Co. and Green Mountain Power Corp., Vermont utilities affiliated with the New England Power Association, died suddenly on June 10 at Brattleboro, Vt.

▶ JAMES E. JOHNSON, vice-president of the Illinois-Iowa Power Co., Danville, Ill., died at his home July 17, after a long illness. A graduate of the University of Illinois, Mr. Johnson started with the power company in 1900 as general manager of the Danville plant. He went to Chicago as vice-president in 1926, returning to Danville when the company moved its main offices to that city. Mr. Johnson was 60 years of age.

▶ KINSLEY VAN R. DEY, 46, a consulting engineer with offices in Boston, Mass., for many years, died at the Newton (Mass.) Hospital recently, following an operation. He was a native of New London, N. H., and was graduated in the business administration course at the Massachusetts Institute of Technology in 1913. His practice embraced civil, electrical and mining engineering interests.

▶ JOHN B. WHEELER, superintendent of investigations for the Southern California Edison Co., died suddenly May 10 in Los Angeles. He was 60 years of age. Mr. Wheeler entered the electrical industry in southern California in 1902, when he became associated with the San Gabriel Electric Co., one of the predecessor organizations of the Edison company. He was superintendent of construction for the Edison company from 1921 to 1932.

▶ BARTON HASELTON, chairman of the board of directors of the Revere Copper & Brass Co., Inc., died June 8 at his home in Rome, N. Y. He was 62 years old. His father, the late Jonathan S. Haselton, founded the Rome Brass & Copper Co., which was merged with the Revere corporation after the death of the elder Mr. Haselton.

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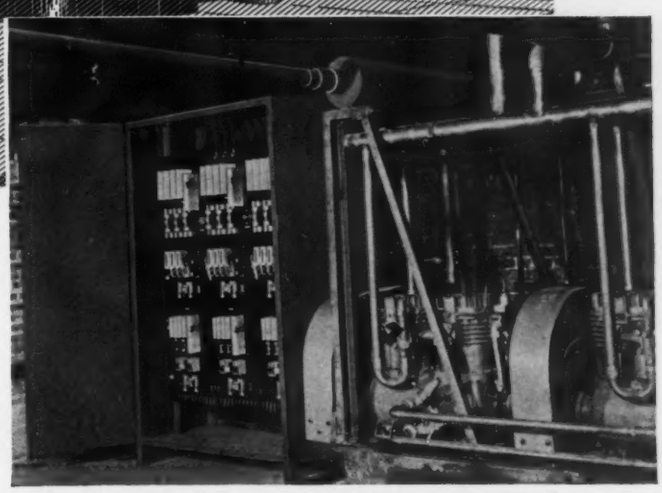

● Maryland's oldest radio station gets Dixie's newest broadcasting studio: Naturally, it is ultra-modern in design, construction and equipment. Equally modern is its Carrier Air Conditioning System with controls by *Monitor*—a combination that guarantees satisfaction to architect, engineer, owner and tenants alike.

The requirements of air conditioning system controls are well known to Monitor. . . . They must be fully automatic, dependable and accurate to a degree. Our experience with many recent installations will assure the success of yours. . . . Glad to cooperate technically without obligation whatever. Write us today.

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The Original JUST PRESS A BUTTON System

Monitor Automatic Controls for The Carrier Air Conditioning System in WFBR's new broadcasting studio operate three 15 h.p. Compressors, one 5 h.p. Fan, one 3 h.p. Evaporator and one 1 h.p. Pump . . . "operation of system and controls entirely satisfactory from the start."

Monitor UP TO 1200 Amperes Controllers

MANUFACTURING - MARKETS

General Electric Net Shows 24% Increase

Earnings of General Electric Co. for the first half of this year showed an increase of 24 per cent over the same 1938 period. Gerard Swope, president, reports profits available for dividends of $16,370,192, equivalent to 57 cents a common share for the first six months, as compared with profits of $13,176,956, or 46 cents a common share in the same 1938 period.

A dividend of 25 cents a share was paid on July 25 to 209,980 stockholders, a record high number, making a total of 50 cents a share in dividends for the first half of this year, the same as for the 1938 period.

Orders received during the first six months this year totaled $169,071,646, as against $128,223,823 for the same period last year, an increase of 32 per cent.

Sales billed for the first six months totaled $146,299,212, as against $130,910,638 for the same 1938 period, an increase of 12 per cent.

A comparative summary of operations, partly estimated and subject to audit at the year-end, is shown below:

	Six Months Ended June 30 1939	1938
Orders received....	$169,071,646	$128,223,823
Net sales billed....	$146,299,212	$130,910,638
Costs, expenses and all other charges except financial...	133,937,646	121,536,908
Net income from sales	12,361,566	9,373,730
Other income, less financial charges.	4,008,626	3,803,226
Profit available for dividends on common stock	$16,370,192	$13,176,956

Earnings available for distribution under the general profit sharing plan for the first six months this year totaled $638,000 and payment will be made early in August to about 60,000 employees eligible under the plan. This payment, together with $1,315,000 for cost of living adjustment, makes a total of $1,953,000 added to regular earnings of employees for the first six months this year, which was equivalent to approximately 4 per cent of the pay roll for employees eligible to receive such payments.

•

Westinghouse Employees Get 10% Bonus in July

A 10 per cent bonus, the highest this year, will be paid to employees of the Westinghouse Electric & Manufacturing Company in July, the company announced this week. In June the bonus was 7 per cent, in May 5 and in April 3 per cent.

The monthly bonus is based on average profits for the preceding three months, the July bonus being based on a monthly average profit for April, May and June of $1,327,544. In February this year Westinghouse restored a 10 per cent pay reduction to all salaried employees.

•

Electric Truck Shipments Continue Upward Trend

While total shipments of electric industrial trucks and tractors for the first half of 1939 numbered 410, against 509 in the same period a year ago, reports of the Department of Commerce show that domestic shipments were 385 against 392 for the respective periods.

New orders for the first six months of this year totaled 336, against 361 in 1938, but domestic new orders increased to 307 from 295 in the first half of last year. Domestic shipments in June this year were 71, against 63 in May and 30 in June, 1938, continuing the upward trend begun in June last year.

•

Distribution Contract Let

The city of Kirkwood, Mo., has awarded the contract for the construction of improvements to the municipal electric distribution system to the Richardson Electric Co., St. Louis, Mo., at $25,950.

Cutler-Hammer Shows Profit of $243,000

Cutler-Hammer, Inc., for the first six months of 1939 reports net profit of $243,000 after all charges, including estimated federal and state income taxes of $60,000. For the first half of 1938, the company reported a net loss of $75,000.

Gross profits from operations for the first half of the current year before expenses, amounted to $1,397,000. Expenses totaled $957,000, while depreciation totaled $99,000 and social security and unemployment taxes took $92,000. Gross profits from operations for the first six months of 1938 amounted to $1,031,000.

The recent upturn in factory activity is shown in the current report for six months in that the first quarter resulted in net profit of only $56,000. The balance sheet as of June 30, 1939, shows total current assets of $4,074,000 against total current liabilities of $389,000.

SQUARE D—Six months to June 30: Net profit, $308,381, equal to 89 cents each on 343,860 shares of $1-par common stock, against $116,328, or 33 cents a share, last year. June quarter net profit was $187,781, or 54 cents a share, compared with $120,600, or 35 cents a share, in March quarter, and $50,687, or 14 cents a share in June quarter a year ago.

ROME CABLE—Quarter to June 30: Net profit, $45,993, contrasted with a net loss of $10,898 for the corresponding period last year.

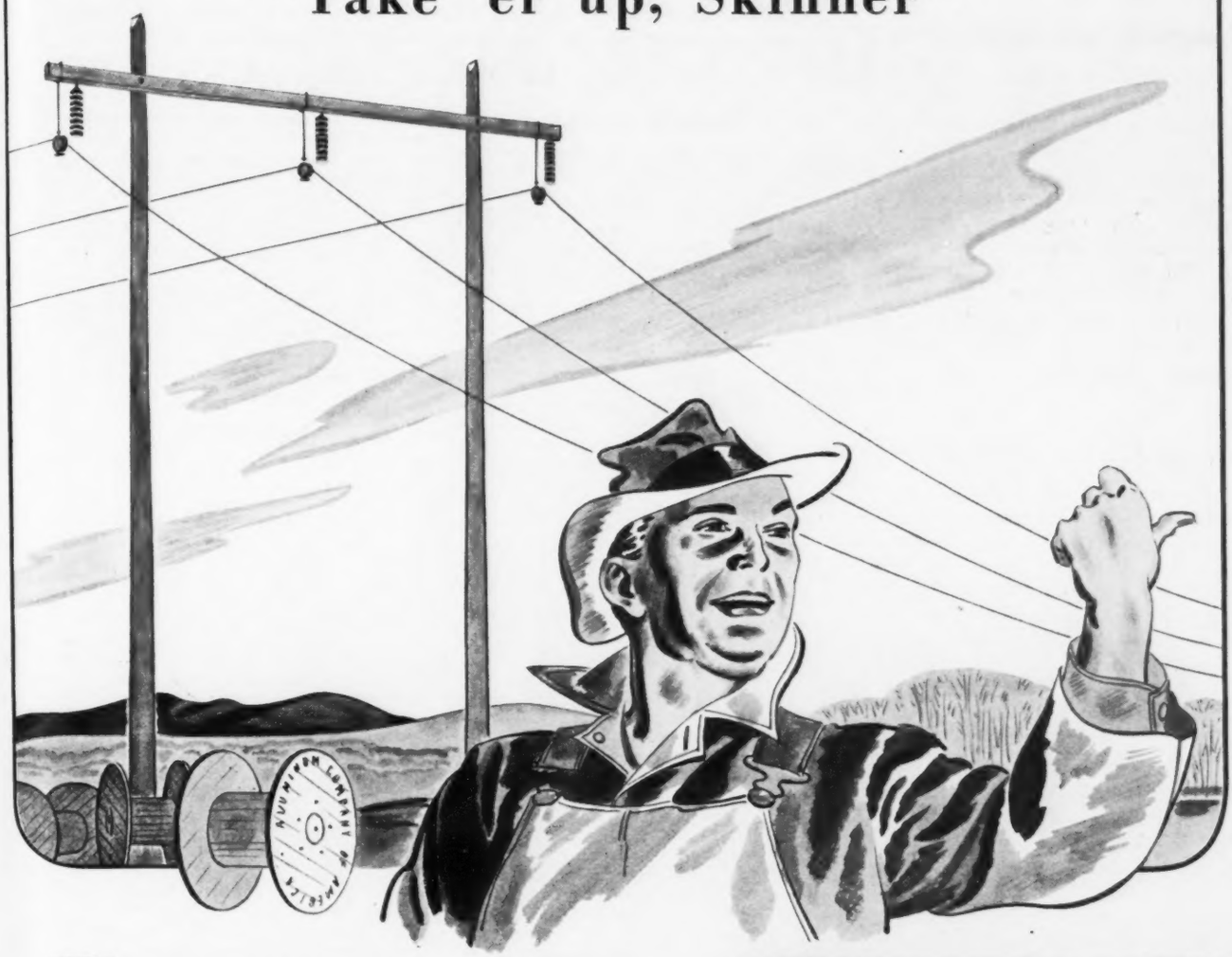
•

Washer Shipments Rise

Factory shipments of household washers in June increased to 120,076 units, the American Washer and Iron Manufacturers Association has reported. An increase of 53.2 per cent over the 78,354 shipped in June a year ago was recorded.

Shipments for 1939 to the end of June numbered 734,060, or 35.4 per cent larger than the corresponding 1938 figure. Ironer shipments in June

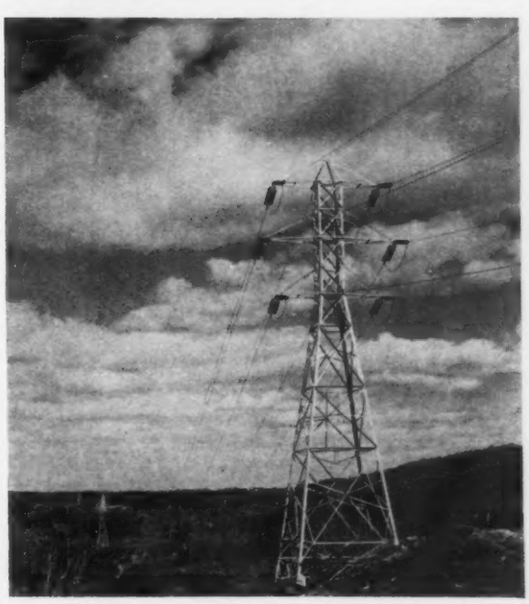
"Take 'er up, Skinner"



And remarkably easy it goes up, too! Far down the line you see the A. C. S. R. conductors rising into place. Properly sagged, they are snubbed off until the tying-in crew comes along. Then, in a few minutes, armor rods are applied and the conductors are clipped in.

Alcoa engineers supply data which enable your designers and line builders to take best advantage of the permanently high strength of A.C.S.R. First costs are held down. Maintenance costs are likewise low.

Over 700,000 miles of A.C.S.R., some of it in service for more than a quarter of a century, have proved the reliability of these conductors and A.C.S.R. engineering standards. ALUMINUM COMPANY OF AMERICA, 2138 Gulf Building, Pittsburgh, Pennsylvania.



A·C·S·R

Aluminum Cable Steel Reinforced

FOR RURAL LINES AND POWER TRANSMISSION

totaled 7,216, as compared with 7,046 a year ago. Six months' shipments were 52,572, against 51,349.

•

Leonard June Sales Soar

Continuing to register record gains over last year, factory shipments of Leonard electric refrigerators during June soared 335 per cent above shipments in the same month in 1938, Ray Legg, general sales manager, has announced. Mr. Legg pointed out that June was the fifth consecutive month of 1939 that saw Leonard sales sharply above those of the comparable months of last year. He declared that reports on distributor and dealer movements indicate a continuance of this trend.

•

Copperweld Issues Stock

An issue of 40,000 shares of Copperweld Steel Co. cumulative convertible preferred stock, 5 per cent series, was offered recently at a price of $50 per share. The shares are of $50 par value. Net proceeds from the sale will be used to repay $1,850,000 of bank loans.

•

Order for Locke Insulator

Locke Insulator Corp. has been awarded a contract for $19,031 worth of transmission line hardware on the Parker Dam power project in California-Arizona. The hardware will be used in the construction of a 140-mile high-tension power line to Phoenix and a 120-mile power line to Blaisdell, from Parker Dam.

•

Will Make Electric Stokers

The Murray Corp. of America will manufacture and sell a diversified line of products, of which the first will be an automatic electric stoker of a radically new design, according to C. W. Avery, president. The first selling activities on the new stoker will be centered in the Detroit area, with expansion in other centers planned in the near future.

New York Metal Prices

	July 25, 1939 Cents per Pound	July 19, 1939 Cents per Pound
Copper electrolytic	10.375*	10.25*
Lead Am. S. & R. price	4.85	4.85
Antimony	12.00	12.00
Nickel Ingot	35.00	35.00
Zinc Spots	4.89	4.89
Tin Straits	48.45	48.60
Aluminum, 99 per cent.	20.00	20.00

* Delivered Connecticut Valley.

Field Reports on Business

Industrial leaders feel that activity in the fall will be better than had been expected. This is reflected in the rising trend of security prices and the optimism expressed in many quarters. Electrical manufacturers report an increase in earnings for the June quarter and first six months over the same 1938 periods.

PACIFIC COAST

July business has been carefully watched as a prospective key for the fall electrical situation and is holding up surprisingly well. June orders for July billing and orders held pending readiness of their respective jobs for the electrical contractor are largely responsible, but, despite lack of direct sales solicitation during early July, wholesalers report a very fair volume of new orders for wiring and lighting staples. The June, 1939, volume of building permits in seven Western states shows 35 per cent increase over 1938 and 30 per cent increase over 1937. Its 5 per cent decrease under May is about half the customary seasonal drop.

Outstanding orders, awards and low bids include bids for Boulder power house of $580,000 for nine 4,000-amp., 23,000-volt circuit breakers, $391,000 for 51 transformers and $250,000 for bus structures and alterations, $52,500 low bid for two 2,500-kva. G. E. generators for Shasta plant, $3,600 welding sets for Mare Island Navy yard, $58,056 low bid for Westinghouse feeder voltage regulators for Los Angeles, $27,460 award to Allis-Chalmers for control metering and switching equipment for North Platte project and $15,000 voltage regulators for San Francisco exposition substation.

Recent copper advances have also stimulated purchasing of many related or component lines, though wholesalers are buying cautiously with annual inventories in mind. Advance orders for such seasonable lines as Christmas lighting sets forecast a fine holiday season. Prospective business predominates in line and power plant material for southwestern installation and includes 26 miles of 11,000-volt transmission and distribution lines and 47 substations for Phoenix, Ariz., area and ten carloads of weatherproof copper wire, largely No. 2 and 4/0 for Los Angeles.

NEW ENGLAND

Public Service Co. of New Hampshire has budgeted $125,000 for rural line extensions this year. In the past ten years the company has built 718 miles of such lines serving 3,313 customers and costing $931,348. During the past week transformers and control equipment were purchased for a new industrial plant to be located at Quincy, Mass., and involving in the neighborhood of $10,000. Large motor sales recently reported included a 750-hp. motor and two 300-hp. motors, all to be installed in Rhode Island rubber works. Small motor sales are steady and inquiries are being received in promising volumes; especially active, notes one district manager, is the demand for loom motors and fractional-horsepower motors.

Wiegand Co. sales of late include a 30-kw. preheater for compressed air service and a 46-kw. oven for use in connection with machines devised to seal hermetically special containers.

Stanley P. Rockwell Co., Hartford, Conn., heat treater, has added a 27-kw. "Cyclone" drawing furnace to its plant. Improvement is noted in the fire alarm telegraph and police signal system market; two utilities in Vermont have sold 55 electric water heaters to date and a 26 per cent increase for the first half year over 1938 sales is reported for this district by the Toastmaster Division, McGraw Electric Co.

New construction proposed includes a new power plant for the Hartford, Conn., Rayon Corporation, estimated to cost $125,000, and a recovery plant for this same company costing about $50,000. The Manhattan Market, Cambridge, Mass., is planning to modernize its store at a cost of about $50,000.

NEW YORK

The recent rise in security prices reflects sentiment for a substantial increase in business during coming months. Optimism is more general among industrial leaders, who believe that a turn is at hand. While the political situation in Washington is being carefully watched, the opinion is that the conservative revolt is constructive.

Reports of electrical manufacturers for the June quarter and the first six months show substantial profits over the 1938 periods. In some cases profits more than offset the losses of a year ago. The reports reflected increased factory activity during recent months and shipments to jobs. While orders in some lines have been spotty during recent weeks there are signs indicating that a fall pickup is assured. This is seen in the present low state of inventories and the prospects of government spending during coming months.

Power production continues upward as utilities press load-building activities. The demand for household appliances indicates that earlier estimates of 1939 volume will be reached, and in some cases passed.

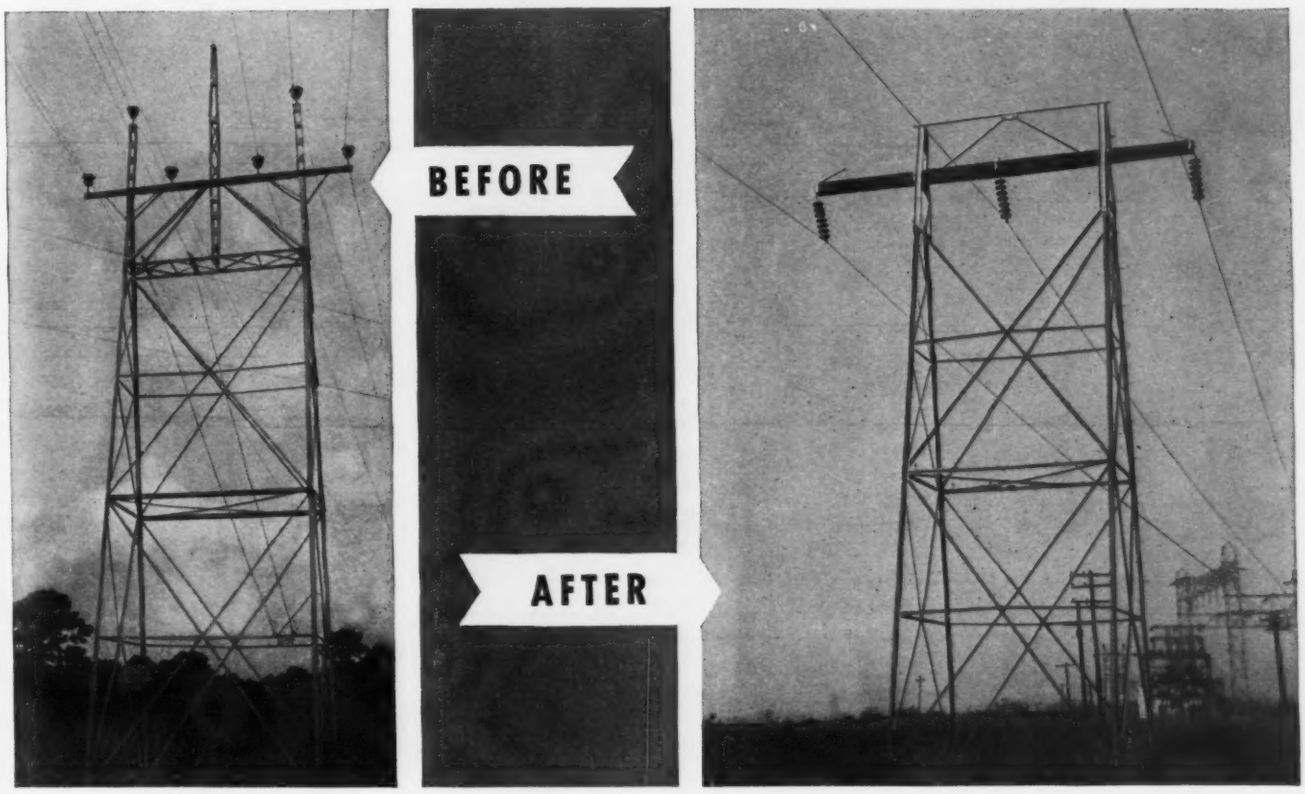
CHICAGO

Electrical business in this area continued to advance as orders and inquiries in most lines showed substantial increases over the previous period as well as last year. The demand for electrical ranges shows considerable improvement over last year and roasters are selling especially well. Several manufacturers of wire and cable report business considerably improved, with sales increases of as high as 35 per cent over a year ago.

The lighting equipment field is active especially in stores, filling stations and other outdoor work. One order was placed last week for 500 aluminum reflectors and 1,000 posts. Manufacturers report motors and control apparatus in demand as are transformers and pole-line equipment. Air-conditioning installations and electric room cooler sales are especially encouraging, running substantially ahead of last year.

Building construction in Illinois for the first six months was approximately $12,000,000 ahead of last year for the same period. Retail trade maintained the pace of the past several weeks. Industrial activity showed a slight pick-up as steel production moved up sharply. Electrical energy output declined from the previous week's level to 8.5 per cent above a year ago.

WE "*Modernize*" TRANSMISSION LINES, TOO



UNDER favorable conditions, the life of galvanized steel is practically indefinite, but electrical requirements often change. A good line may be headed for obsolescence simply because continued, economical operation may dictate stepped-up electrical capacity and voltage. The problem is not infrequent in our experience.

A typical example was an 85-mile transmission line in the south. This old pin type two-circuit 66 KV line could no longer meet requirements. The change required was to a single-circuit 110 KV line.

A rigid field inspection disclosed the 30 year old steel in good condition. Obviously, the thing to do was to save as much of it as possible. Using the old construction as a base, there was developed, in collaboration with the customer's engineers, a modernization plan which was not only effective and economical as to material and fabrication but held erection costs to a minimum. The new material was designed to use existing holes throughout, obviating field drilling.

This typifies the advantage in employing specialists in the design, fabrication and erection of transmission line structures. American Bridge Company devotes an entire plant to the fabrication and galvanizing of tower steel alone. Whether your problem is one of modernization of an existing line or building a new one you may freely call upon the specialized experience of our engineers.

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Recent Rate Changes

CONSOLIDATED GAS, ELECTRIC LIGHT & POWER CO. of Baltimore has decided to abide by an order handed down by the Maryland Public Service Commission recently in which lower rates are established in Baltimore County for street lighting. In the order the company was requested to file the new schedule of rates by August 1. The commission's order set a rate of $25.75 per year for 100-cp. lamps and $40.50 for 250-cp. lamps within 3 miles from the boundary between Baltimore city and Baltimore county and $26.25 for 100-cp. lamps and $41.25 for 250-cp. beyond the 3-mile zone. The order required that the new rate be made effective as of July 1, 1937. In notifying the commission that the company would accept and abide by the order, Herbert A. Wagner, president of Consolidated, said that the company did not admit that the commission is legally authorized to make an order fixing rates retroactively.

IDAHO POWER CO. has reduced its rates for its eastern Oregon customers by $7,000 a year. The cities affected include Ontario, Huntington and Nyssa. The company also is reducing rates for its Idaho customers.

ILLINOIS COMMERCE COMMISSION has announced that electric rate revisions effective during the month of June resulted in a reduction of $936,671 in annual operating revenues of the electric utility companies.

BRYAN, OHIO, municipal power plant's new schedule of electric rates has been approved by the local board of affairs. The $1 monthly minimum charge and 20 per cent reduction for prompt payment of bills will be retained. The new commercial rates, effective October 1, will be 5 cents each for the first 50 kw.-hr., 4 cents each for the second 50 kw.-hr. and 3 cents each for the next 400, 2½ cents each for the next 500 and 2 cents for the next 1,000, all over 2,000 kw.-hr. being 1½ cents. Present rates are 5 cents per kilowatt-hour for the first 100 kw.-hr.; next 900 kw.-hr. at 3 cents per kilowatt-hour; all over 1,000 at 2 cents per kilowatt-hour. The new power rates are first 2,000 kw.-hr. at 3 cents per kilowatt-hour, next 2,000 at 2¼ cents per kilowatt-hour, next 2,000 at 2 cents per kilowatt-hour; all over 6,000 at 1½ cents per kilowatt-hour. The present power rates are first 2,000 kw.-hr. at 3 cents per kilowatt-hour, next 2,000 at 2½ cents per kilowatt-hour and all over 2,000 at 2 cents per kilowatt-hour.

OHIO EDISON has announced new rates which will save 4,000 small commercial and secondary power consumers in Youngstown approximately $60,000 annually. The new rates, which went into effect July 1, became operative a year and ten months before lower rates would be necessary under the company's present contract with the city. New rates are: 5 cents per kilowatt-hour for the first 50 kw.-hr.; 4 cents per kilowatt-hour for the next 250 kw.-hr.; 3 cents per kilowatt-hour for the next 4,700 kw.-hr.; and 2 cents per kilowatt-hour for all over 5,000 kw.-hr. This compares with the former rate of 5 cents per kilowatt-hour for the first 100 kw.-hr.; 4 cents per kilowatt-hour for the next 500 kw.-hr.; 3½ cents per kilowatt-hour for the next 1,400; and 3 cents per kilowatt-hour for all over 2,000 kw.-hr.

ALABAMA POWER CO. has announced a $36,700 reduction to rural domestic users, approved by the Alabama Public Service Commission. The new rate makes the "objective" rate applicable to all rural users after five years, reduces the minimum

capacity requirements of rate "E-4" for non-residential customers from 1,000 to 400 watts and allows yard and garage lighting without increasing capacity requirements. The rural residents will also be allowed 12 instead of 10 kw. of cooking and heating loads without any additional charge or any increase in capacity requirements.

•

Municipal Plants

AURORA, IND.—State Supreme Court reversed a decision of the lower court when it upheld an appeal of the Public Service Co. of Indiana from the lower court's order appointing appraisers for the condemnation of the electric light plant, gas works and the water plant owned by the utility company. The high court held that most of the questions presented by the company were decided in the City of Lebanon case, but there is a question as to the validity of the election on which the city seeks to condemn the properties. It is pointed out that the company owns three separate and distinct properties or utilities in the city and that the 1933 law contemplates an election on whether "a utility" is to be purchased, not an election on whether or not all the property of an owning corporation is to be purchased. That in this case the ballot only permitted the voter to signify whether the city should buy all three utilities. The voter was not permitted to vote in any way as to the separate utilities owned by the company. The court ruled it was an error to appoint appraisers for this reason.

PROVO, UTAH—Two court actions have been filed by citizens, objecting to the procedure followed by Mayor Anderson and the City Commission in their efforts to go ahead with the construction of a municipal electric plant and distribution system. The Utah Supreme Court has granted a writ of mandate requiring the city to show cause why an agreement recently entered into with John Nuveen Co. of Chicago for the sale of bonds should not be submitted to a referendum vote. The agreement with Nuveen provides that $850,000 in 4½ per cent revenue bonds would be sold, callable on any interest date at a premium of 4½ per cent, and to be exchanged for 3½ per cent bonds. It also gives the Nuveen Co. the privilege without competitive bidding of handling all future bond issues for extensions and improvements of the proposed plant and distribution system. On July 13 the District Court in Provo ordered the city officials to show cause why an injunction should not be issued restraining them from spending any of the money secured from the sale of the $850,000 in bonds to Nuveen. The injunction, if granted, would require the city officials to buy back the bonds and destroy them, and would also hold them personally liable for expenditures already made from the light and power fund. The District Court action alleges that the emergency clause was used by the city commission when no emergency existed and that the bond ordinance passed and all acts of city officials under this ordinance are illegal.

WATERTOWN, WIS.—City public service board recently met to consider the advisability of starting a municipally owned lighting plant in accordance with a recently introduced City Council resolution. Meeting with the commission were representatives of the Wisconsin Gas & Electric Co.

LAKE PLACID, N. Y., municipal lighting plant has reduced its rates, effective July 1, $4,715 annually.

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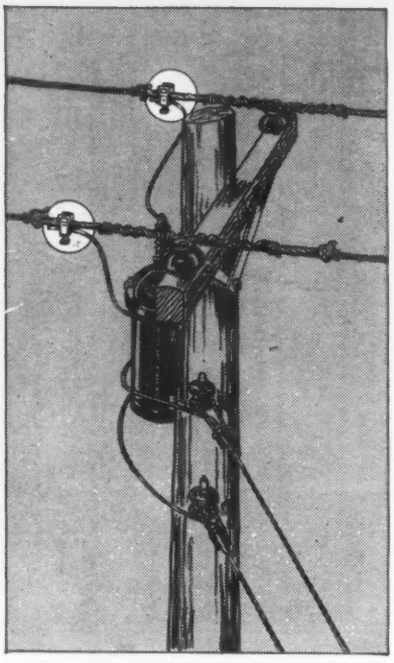

A C S R rural line transformer pole.

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Sales Opportunities

MAQUOKETA, IOWA—Iowa Electric Co., Cedar Rapids, Iowa, has approved plans for modernization and improvements in hydro-electric power plant on Maquoketa River, Maquoketa, including installation of equipment. Cost estimated close to $100,000. Harza Engineering Company, 205 West Wacker Drive, Chicago, Ill., is consulting engineer.

MCPHERSON, KAN.—City Council is arranging early call for bids for extensions and improvements in municipal electric power plant, including installation of turbine-generator unit, condenser, low-pressure heater and auxiliary equipment, switchgear, transformers and accessories. Cost estimated close to $350,000. Burns & McDonnell Engineering Company, 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

DEARBORN, MICH.—Ford Motor Co., Dearborn, plans installation of motors and controls, switchgear, conveyors, electric hoists and other equipment in new one-story addition, 300x680 feet, at River Rouge plant, to be used as a car delivery building, with testing, inspection and other operating divisions. Work is scheduled to begin at once. Cost estimated close to $5,000,000.

AUGUSTA, ARK.—City Council is considering preliminary plans for extensions and improvements in municipal electric power plant, with installation of equipment to double present capacity. Estimates of cost are being made.

BOULDER CITY, NEV.—Department of Water and Power, 207 South Broadway, Los Angeles, Calif., has plans under way for shops and operating buildings at Boulder City, to be used in conjunction with power supply from federal hydro-electric power development at Boulder Dam, consisting of several structures for electrical and mechanical service, electric-operated pumping station and other units. An air-conditioning system will be installed in certain buildings. Bids will be asked soon.

OGDEN, UTAH—Utah Power & Light Co., Salt Lake City, plans extensions and improvements in primary and secondary lines, and other distribution facilities at Ogden, including power substation units and other structures, service additions, etc. Cost estimated over $200,000.

GERING, NEB.—Bureau of Reclamation, Denver, Colo., receives bids until August 2 for one 6,900-volt, three-phase, 60-cycle, oil-immersed, self-cooled, outdoor-type transformer with accessories; two 7,500-volt, 600-amp., three-pole, single-throw, outdoor-type oil circuit breakers, and nine 7,500-volt, 600-amp., single-pole, single-throw, hook-stick operated, outdoor-type, disconnecting switches, all for installation in Gering substation, Kendrick project, Wyo. Equipment will be installed by government (Specifications 1259-D).

MINNEAPOLIS, MINN.—Chicago, Rock Island & Pacific Railroad Co., Metropolitan Life Building, Minneapolis, plans installation of motors and controls, conveyors, switchgear, electric hoists, loaders and other equipment in new railroad terminal on Fourth Street, Eighth to Tenth Avenues. Cost estimated close to $300,000.

PHILADELPHIA, PA.—William Cramp & Sons Ship & Engine Building Co., Philadelphia, William T. Smith, president, controlled by American Ship & Commerce Corp., 39 Broadway, New York, N. Y., plans installation of heavy-duty motors and controls, switchgear, conveyors, electric hoists and other equipment in connection with modernization and improvements in local shipbuilding plant at Richmond and Norris Streets, closed for a number of years. It is proposed to have yard ready for resumption of operations by close of year. Cost reported over $500,000.

MEMPHIS, NEB.—Nebraska Power Co., Omaha, Neb., plans extensions in lines for rural electric system at Memphis, Leshara and vicinity. Application has been made for permission. Work is scheduled to begin soon.

MONONGAHELA, PA.—School Board, A. J. Brown, secretary, receives bids until August 7 for tools and equipment for electrical shop at industrial arts school. Also at same time for equipment for other vocational shops at school.

NASHUA, IOWA—Iowa Public Service Co., Waterloo, Iowa, plans extensions and improvements in street-lighting system at Nashua, including installation of new units.

TACOMA, WASH.—United States Engineers Office, Central Building, Seattle, Wash., receives bids until August 8 for construction of Stevens dam (previously known as Mud Mountain dam), on White River, about 35 miles east of Tacoma, 400 feet high, including penstocks, valves, trashracks, lined tunnels and other installation. (Cost estimated about $4,000,000.)

TULSA, OKLA.—City Water Department plans installation of heavy-duty electric-operated pumping machinery in connection with waterworks extensions and improvements, including units with capacity of 20,000,000 gallons per day in Mohawk station, and units with rating of 27,000,000 gallons daily at Spavinaw dam. Entire project is estimated to cost close to $600,000.

PERTH AMBOY, N. J.—City Council has plans under way for improvements in municipal electric power station. Financing is being arranged through federal aid.

PERTH AMBOY, N. J.—Barber Asphalt Corp., Insurance Company of North America Building, Philadelphia, Pa., plans installation of motors and controls, conveyors, transformers and accessories, switchgear and other equipment in proposed new refining plant at Barber Station, Perth Amboy, to replace portion of present refinery at that place for complete modernization of works. Preliminary plans for project are in progress. Cost reported about $1,000,000.

ALLENTOWN, PA.—Pennsylvania Power & Light Co., Allentown, plans new transmission line over Lehigh River, connecting with local system. Permission has been secured and work is scheduled to be placed under way soon.

CLIFTON, N. J.—Curtiss-Wright Corp., Propeller Division, 64 Lakeview Avenue, Clifton, plans installation of motors and controls, conveyors, electric hoists and other equipment in two new additions to plant for large increased capacity. Cost reported over $225,000. Work will be placed under way at once.

NEVADA, MO.—City Council is considering a new municipal electric power plant and has engaged William Spann, Interstate Building, Kansas City, Mo., consulting engineer, to make surveys and estimates of cost.

FAIRBURY, NEB.—City Council plans extensions in lines in Gage and Jefferson Counties for rural electrification. Application has been made for permission. Work will be placed under way soon.

Recent Allotments Announced by REA

Among the recent allotments made by the Rural Electrification Administration to co-operatives in various states are the following:

IOWA—Guthrie County Rural Electric Co-op. Assn., Guthrie Center, John A. McLuen, supt., $255,000 to build 264 miles of line, 625 members in Guthrie, Dallas and Audubon counties.

MINNESOTA—Brown County Rural Electrical Assn., Sleepy Eye, H. A. Rosseth, supt., $128,000 to build 127 miles of line, 315 members in Brown, Redwood, Renville, Nicollet and Sibley counties.

MISSISSIPPI—Southwest Mississippi Electric Power Assn., Lorman, J. S. Drane, supt., $62,000 to build 75 miles of line, 228 members in Copiah, Jefferson, Claiborne and Lincoln counties.

MISSOURI—Ralls County Electric Co-op. Assn., New London, J. Art Weaver, supt., $57,000 to build 66 miles of line, 181 members in Ralls, Monroe and Pike counties.

NORTH CAROLINA—Four County Electric Membership Corp., Kerr, S. S. Shubrick, supt., $90,000 to build 97 miles of line, 371 members in Duplin, Pender, Bladen and Sampson counties.

OHIO—Guernsey-Muskingum Electric Co-op., Inc., New Concord, H. B. Smith, supt., $170,000 to build 166 miles of line, 557 members in Guernsey, Muskingum, Morgan, Noble, Licking and Tuscarawas counties.

PENNSYLVANIA—Jefferson Electric Co-op., Inc., Brookville, L. E. Startzell, president, $212,000 to build 195 miles of line, 656 members in Jefferson County.

SOUTH CAROLINA—Edisto Electric Co-operative, Inc., Bamberg, Edward H. Henderson, attorney, $149,000 to build 188 miles of line, 577 members in Bamberg, Allandale, Orangeburg and Dorchester counties.

TEXAS—Hill County Electric Co-op., Inc., Itasca, E. D. H. Farrow, supt., $42,000 to build 53 miles of line, 163 members in Hill, Ellis and McLennan counties.

WISCONSIN—Oconto Electric Co-operative, Oconto Falls, Earl G. Redman, supt., $115,000 for the purchase of the hydro-electric plant which now serves the project with wholesale energy.

WYOMING—Stonewall Electric Co., Trinidad, Colo., A. L. Klees, president, $24,000 to build 19 miles of line, 188 customers in Sheridan County.

Late last month the following allotments were made:

TENNESSEE—Southwest Tennessee Electric Membership Corp., Ervine H. Wright, supt., Brownsville, $38,000 to build 44 miles of line, 183 members in Tipton, Haywood, Lauderdale, Madison, Henderson and Crockett counties. Middle Tennessee Electric Membership Corp., W. O. Haggard, Jr., supt., Murfreesboro, $12,000 to build 4 miles of new line and to defray certain expenses connected with the initial operations of the project which cannot be covered by the construction loan. Pickwick Electric Membership Corp., Glenn Hassell,

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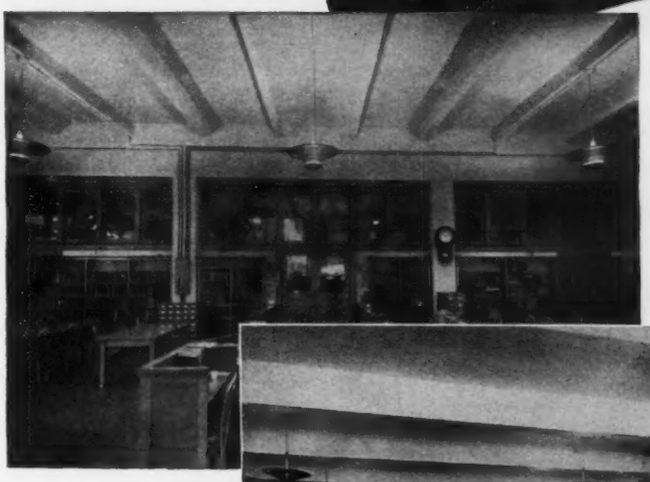

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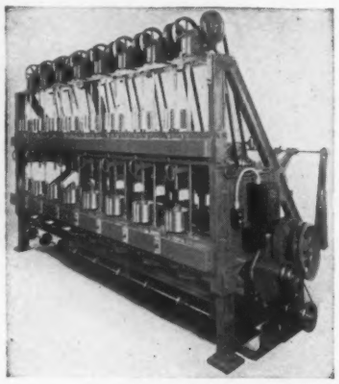

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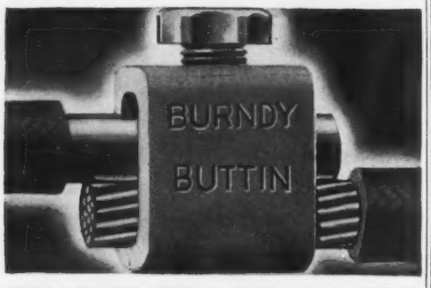

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What Kinds Are Available—What Makes Them Run and What They Will Do—How to Repair, Rewind, and Reconnect Them

By CYRIL G. VEINOTT

Design Engineer, Small Motor Engineering Dep't
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431 pages, 314 illustrations, 22 tables, $3.50

HERE is a practical manual to help you get better service from your small motors. Covers principles of operation, characteristics, construction, and winding arrangements employed in principal types of fractional horsepower motors in use today. Shows how to take performance tests; how to find types and horsepower rating of motor required to drive a motor-operated appliance; how to repair and rewind motors, etc.

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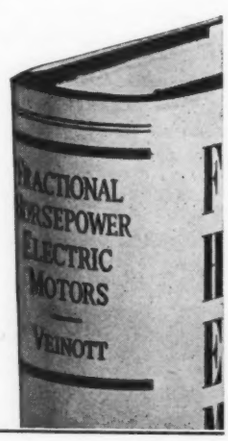

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business manager, Adamsville, $411,000 to build and acquire 158 miles of line, 2,115 members in McNairy and Hardin counties.

UTAH—Moon Lake Electric Association, Inc., E. Conklin, acting superintendent, Mt. Emmons, Utah, $285,000 of which $72,000 will be used to construct a generating plant, and the remaining $213,000 to build about 220 miles of line, 681 members in Duchesne and Uinta counties.

VIRGINIA—Central Virginia Electric Co-op., Lewis A. Bress, supt., Lovingston, $51,000 to build 53 miles of line, 233 members in Nelson, Albemarle, Fluvanna and Amherst counties.

ILLINOIS—M. J. M. Electric Co-op., Inc., Carlinville, Herman F. Dubbelde, president, $292,000 to build 336 miles of line, 852 members in Macoupin and Montgomery counties.

IOWA—Eastern Iowa Light & Power Co-op., Davenport, S. N. Jordan, supt., $340,000 to build 283 miles of line, 739 members in Scott, Clinton, Johnson, Cedar, Muscatine and Louisa counties.

MICHIGAN—Tri-County Electric Co-op., Inc., Portland, Dolph Wolf, supt., $292,500 of which $200,000 will be used to build about 180 miles of line, 516 members in Isabella, Clare, Gratiot and Montcalm counties, and $92,500 which will be used for an addition to the existing generating plant.

MINNESOTA—Co-operative being formed, Harry Edmunds, Cedar, Minn., correspondent, $500,000 for construction of a co-operative generating plant in Hennepin County. REA-financed distribution co-operatives, centering in Wright, Anoka and Stearns counties, are banding together in a separate co-operative organization to build and operate the new plant. The plant will have capacity to serve 10,000 farms. It is possible that groups in Kanabec, McLeod, Kandiyohi, and Crow Wing counties will join later.

•

Fair Visitors Seen in a Buying Mood

Visitors to the New York World's Fair are not only intent on seeing the sights but are also in a buying mood, Edward H. Sniffin, director of the Westinghouse exhibit, said in a letter to Grover Whalen, president of the fair.

Mr. Sniffin said that there is good reason to believe that new peaks in sales may be achieved in 1940 as a result of participation in the fair. The merchandising division has studied attendance at the exhibit and many visitors have left their names and addresses after viewing demonstrations of electrical appliances. These names are being forwarded to local dealers to follow up.

More than a million visitors were greeted at the Westinghouse exhibit from April 30 to June 1.

•

Ohio Power Construction

Ohio Power Co. division serving Coshocton, Tuscarawas, Guernsey, Harrison and Holmes counties has announced plans for a $160,000 construction and remodeling program at Coshocton.

High Service Quality Demanded and Given

[*Continued from page 35*]

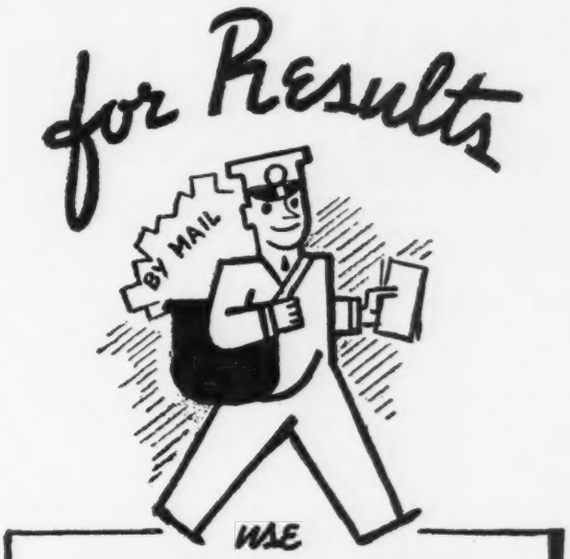
contacts are connected to trip the breaker. Potential for the CR power directional relays, used in loop service, is also taken from the line potential transformers.

Wound-type bushing current transformers are used in each oil switch. The currents for the power-directional relays and the transformer-overload relays are fed from these transformers as shown in the diagram.

Regardless of whether the station is operating on preferred or emergency service, if both lines go dead, the closed switch will open. Should both feeders become re-energized at the same time, the preferred circuit only will be closed to the station bus. This is accomplished by selective settings of the CP relays.

At KNX are two white lamps connected across the potential transformers on each line. From this indication the operator may always know which line is energized or if both are. He also has a red lamp indicating the breaker which is closed. The two push buttons for his use are located on the same panel as are the indicating lights. At a convenient time, assuming operation on the emergency line, the operator desires to switch over to the preferred line. After observing the indications of the lamps, he simply pushes the preferred control button. This operation causes the breakers to parallel for three cycles and automatically opens the emergency switch. Should the operator desire to change back to the emergency circuit, he needs only to press the push button marked emergency. Again, the switches will be paralleled for three cycles.

With the six-pole switch in the lower position, KNX operating on loop service with both lines energized from the source, if both lines go dead at the same time, both switches will open. It is possible that one feeder would be fed from steam, the other from hydro. However, the station will be closed to the first hot line. When the second line is energized it will automatically be closed in paralled. If both lines come hot together the preferred line will close first, the emergency line reclosing when the CP timing is complete.



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JASPER BLACKBURN PRODUCTS CORP.

Main and Clinton Sts. St. Louis, Mo.

Fluorescent Lamps Aid Air Conditioning

[*Continued from page 29*]

tioned productive areas at Hershey will be windowless. An interesting sidelight may be obtained from the fact that the lighting load in most completed areas is more than equal to the power load. "Combination" lamps are employed at Hershey, utilizing a 275-watt Cooper-Hewitt mercury tube in the same fixture with four 150-watt incandescent bulbs. A daylight effect is obtained by blending the blue-green mercury light with the yellow-red incandescent light.

At the recently constructed plant of the Simonds Saw & Steel Company, Fitchburg, Mass., installations of air conditioning and Cooper-Hewitt fluorescent lamps have worked hand in hand to provide another landmark in the trend to windowless plants. The estimated savings in the air-conditioning system may be stated as around $17,000 in investment and about $5,000 annually in operating cost.

Basis of Savings Estimates

The economics may be approached, with regard to lighting units, on the basis that ¼ ton of refrigeration is required per kilowatt of lighting. The actual cost of installed equipment may vary between $600 and $800 per ton, considering initial installation. If the system can be reduced to smaller tonnage savings may be effected of from $150 to $300 per ton. Naturally, all cost figures are dependent on building construction, location, design and the like. The usual operating time of a refrigeration air-conditioning system may be estimated at about 2,000 hours per year.

In the powdered metal department of the Carboloy Company, Detroit, the materials and processes involved require close control of temperature and humidity, This department, housed in a room 105 ft. long and 60 ft. wide, requires a relative humidity held at 35 per cent, plus or minus 2 per cent, and temperature at 85 deg. F., plus or minus 1 deg.

Air-conditioning costs were appreciably reduced, while retaining the desired high level of illumination of 40 to 50 ft.-candles through the use of Cooper-Hewitt fluorescent lamps. To obtain this level with incandescent lamps would have required a lighting energy input about 12 kw. higher. The saving in air-conditioning costs may be stated:

	12 x ¼ = 3 tons of refrigeration
Estimated Savings:	$200 x 3 = $600 (first cost) (Based on $200 per ton installation)
Estimated Savings:	(Based on 2,000 hours at 3 to 5 cents per ton per hour) $180 to $300 (operating)

Air conditioning probably has as great a beneficial effect in the textile industry as in any other one industry. Several modern plants will soon be built in the South by Dexdale Hosiery Mills, incorporating the latest improvements in machinery and other equipment. Air-conditioning systems will be maintained in these plants at new economy by the reduced wattage consumption of Cooper-Hewitt fluorescent lamps.

Possibly it may seem premature to make any predictions about the future of factory air conditioning at this time. Yet, in the light of our present knowledge, it seems quite reasonable to suppose that air conditioning will some day be a commonplace in industry. Certainly the aid of more efficient light sources will go a long way toward stimulating its use to a greater extent than has ever before been deemed practicable.

•

PWA Is Not Abandoning Yadkin River Project

The Public Works Administration has no intention of abandoning the $6,500,000 Yadkin River power project, according to E. M. Knox, High Point, N. C., city manager.

The city has decided to perfect appeals from two recent rulings by Judge H. Hoyle Sink restraining the project, but other plans for the project remain incomplete, pending a decision by the United States Supreme Court on the "new river case," in which the FPC seeks to require Appalachian Power Co. to secure a federal license for a hydroelectric project in Virginia.

•

Organize Engineering Firm

Announcement has been made by C. Maxwell Stanley and Arthur E. Stanley of the organization of a firm under the name of Stanley Engineering Co. The new company has acquired the practice of Young & Stanley, Inc., engineers of Muscatine, Iowa, and will continue to engage in the general practice of engineering.

Procedure of Change from Delta to Wye Distribution

[*Continued from page 36*]

connections at the banks which must be banked wye before service can be restored at 4 kv. This outage is held to a minimum by assigning a man to each bank who is responsible for clearing the bank from the line at the same time service is being interrupted for changing substation connections.

In rebanking the substation and three-phase banks it is important that it be done so that three-phase motors will not be reversed in rotation. This is done by keeping phase wires in the same position in relationship to transformer leads (Fig. 1).

In some cases where the load is light on a three-phase tap it is practical to convert one of the present conductors to a neutral, operating the circuit as two-phase wires and a neutral and supplying any three-phase load from two transformers. To obtain same rotation in converting such banks see Fig. 2 a and b.

After service is restored at 4 kv. and three-phase banks are working, the only job remaining is to transfer portions of the single-phase load from the two loaded phase wires to the third phase, the ground having been removed from this phase while the substation was being reconnected.

The conversion may be carried out by interrupting service only a few minutes, whereas several hours may be required if all changes are made with the system dead. Outage may be only momentary if the load can be transferred to a temporary substation and the main substation connected for 4 kv. before service is interrupted. If this is done it is important to obtain clearance on three-phase banks before interrupting service.

By employing the above described system and suggestions it will be found that most of the work may be done during the day and without great haste. Thus there is less possibility of mistakes that may prove expensive.

•

Oil Burner Shipments Rise

Domestic shipments of oil burners during May, as reported by 178 manufacturers, totaled 14,441, as against 10,051 in April and 8,177 in May last year, according to the Department of Commerce. For the first five months domestic shipments were 50,587, against 34,001 in the same period last year.

Daunt Luminaires MEET MODERN LIGHTING REQUIREMENTS by giving 30% MORE LIGHT

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ARISTO-LITE
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Letters to the Editor

Public Relations Value of Independent Consulting Engineers

To the Editor of ELECTRICAL WORLD:

It has been the practice for electric utilities to include in their organizations or closely to associate with themselves engineering and construction departments or companies that provide the additional facilities as and when they are needed.

During the years of depression many of these departments or companies were abandoned entirely or reduced to skeleton organizations. Now, with the advent of the need for additional facilities, the utilities are rebuilding or expanding their departments or companies to take care of these new requirements.

It is my opinion that right here is where the utilities are losing a grand opportunity to regain badly shattered reputations—whether justly so or not is not the question. Utilities, these days, need all the independent friends they can muster. And one means of acquiring these friends is to help maintain the independent consulting engineer by giving employment to him. He would be a valuable asset to the utility in any community. He is always an intelligent, alert citizen, enjoying the respect of his neighbors.

But utilities seem to put immediate savings or profits so prominently in the foreground that a true sense of values is obscured and the ultimate benefit of parceling out jobs to various engineers, members of the community in which they operate, is entirely lost sight of.

It is not with the idea of buying loyalty to a good cause that I suggest this. But other members of a community look upon an independent engineer, who occasionally works for the utility, quite differently than they do upon a regular employee, and the former's influence is consequently much greater and more valuable to the utility.

Broadly speaking, when operating managers give more attention to creating good relations than making money for their stockholders they will soon discover that the latter has taken care of itself, because of the success of the former. It is axiomatic that, in pursuing happiness, we lose it.

In the pursuit of maximum earnings the utilities are losing something vital, and no one regrets it more than one who is their friend and who appreciates their distressing problems as well as their marvelous accomplishments. And the public in general would be thoroughly responsive to full approval of such maximum earnings, if it were not for the early failure of the utilities to cultivate good relations first and make money second. Even today certain under-executives fail to appreciate this need, evidence of which is to be noted all too frequently.

It would be well for utilities to reorganize along more modern lines and proceed more intelligently or the trend toward public ownership will grow, and that is just what these United States do not want.

And in this work the independent engineer can and should be of invaluable service, but the utilities should recognize this by seeing that he is not starved out of existence.

WARREN D. SPENGLER,
Hudson, Ohio

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First Outdoor Lighting System

To the Editor of ELECTRICAL WORLD:

Workmen digging on the Cornell University campus have unearthed two sections of rusty wrought-iron pipe which, on inspection, have been identified as part of the conduit laid in 1875 for the first outdoor electric lighting system in the Western Hemisphere, which extended from Morrill Hall to Sage Chapel.

Though buried for 64 years, the pipe could still perform its original function, according to professors of the School of Electrical Engineering. The copper wire in the center (see illustration) is protected by muslin strips and the surrounding space filled with beef tallow, originally purchased from an Ithaca butcher for the experiment.

Copper conductor in the center of the wrought-iron pipe is protected by muslin strips

The space between the conductor and the pipe is filled with beef tallow. Such was the conduit for the first outdoor electric lighting system in the Western Hemisphere

In 1875 Profs. William A. Anthony and George S. Moler built in the Cornell shops the first dynamo in America and used it to provide electricity for lights on the campus, when New York and Paris were still illuminated by flickering gas jets. The dynamo, still in running order, as was dramatically demonstrated at the 60th anniversary of the College of Engineering in 1931, is on display in Rockefeller Hall.

Professors Moler and Anthony, by their early work in the field of electricity, made Cornell a pioneer in electrical engineering and laid the foundation for the first department and later the first school of electrical engineering in this country.

W. A. LEWIS, Director
School of Electrical Engineering,
College of Engineering,
Cornell University, Ithaca, N. Y.

•

First Half of Year Is Record for Copperweld

Billings of the Copperweld Steel Company for the first six months of 1939 were the largest ever reported in the first half of any year in the history of the company, according to S. E. Bramer, president, totaling $4,311,583, as against $3,012,275 in the same period last year. The company's plant at Glassport, Pa., is currently operating at 75 per cent capacity, he added.

For the half year the company reports a net income of $388,294, equal to 90 cents a share on the outstanding common stock. Total earned surplus for the first six months was $855,331.

•

G.E. Wins Program Honor

First honors in its classification "for producing a radio program of intrinsic excellence and real public service" were awarded to General Electric's incandescent lamp department at Nela Park by the National Federation of Press Women. The classification was that of a radio program produced by a woman. The federation selected the "Hour of Charm" program on which appears Dorothy Thompson.

•

Indiana Bond Redemption

Indiana & Michigan Electric Company will redeem on August 1, at $1,080 for each $1,000 bond, together with accrued interest, its outstanding first mortgage 50-year 5 per cent gold bonds due August 1, 1957.

Direct Stroke Proves Length of Lightning Tail

[*Continued from page 37*]

stroke terminal. The test arresters and the recording equipment are connected between it and the steel framework of the building. Particular care has been taken to eliminate the possibility of any of the stroke current by-passing the equipment.

The accompanying curve shows the current-time characteristic of the stroke. It consisted of a single discharge of negative polarity with an initial high amplitude component of 21,000 amp. crest, followed by low amplitude component of more than 18,000 microseconds duration.

The test arrester represents a line of 3,000-volt arresters developed primarily to cope with the severe lightning conditions experienced on certain rural circuits.

Evidence is available that this is a typical stroke, but undoubtedly there are strokes of greater severity which might cause failure of an arrester. However, it must be borne in mind that the current discharged through the arrester in this instance of full direct stroke is probably more severe than would be discharged by the arrester installed under the usual conditions of service on a system subjected to this same stroke.

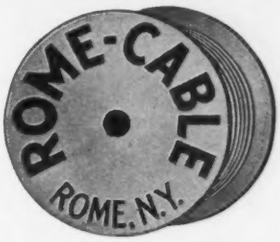
•

Power Production in Argentina Rises

A sharp expansion in the production and use of electric power in Argentina has taken place since 1935, it is revealed in a survey just completed by the finance department of the Argentine Information Bureau, New York. The output of electricity in the republic during 1937 totaled 2,203,150,260 kw.-hr. This compares with 2,054,967,671 kw.-hr. in 1936 and 1,864,817,228 in 1935.

There were 914 electric power plants operating in Argentina in 1937, as compared with 899 in 1935. Sale of electrical energy produced 217,449,690 pesos in 1937, against 192,886,246 pesos in 1935. Of the total electrical output industry utilized 43.4 per cent, private homes and offices 30.7 per cent, railways 18 per cent, and public lighting 7.5 per cent. The total amount of horsepower utilized in production of electricity in 1937 was 1,605,395, compared with 1,556,542 hp. in 1935.

Approximately 90 per cent of the electrical current in Argentina is alternating current.



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Read
GETTING ALONG WITH PEOPLE
by MILTON WRIGHT

Best Efficiency at Lowest Cost Aim of Boiler Control

[*Continued from page 32*]

water to boiler, and steam from superheater.

The third Micromax records water temperatures throughout the system. These temperatures include raw water to heat exchanger, raw water to hot process softener, water from drain exchanger, water from high-pressure heater, water from intermediate pressure heater, boiler feed pump suction, raw water to low-pressure heater.

By having allied temperatures on a single strip chart record, it is possible at a glance to determine the conditions and performance of the corresponding sections of the boiler unit; for instance, a comparison of the in and out temperatures of the air and gas at the preheater source serves as a check on the condition of the heat transfer surfaces of this unit.

Boiler Water Purity Recorder

To measure the concentration of impurities in the boiler water, a Micromax conductivity recorder indicates and records the electrical conductivity of a continuously flowing sample of boiler water in terms of sodium chloride equivalent. The recorder shows when the impurities reach a dangerous concentration and boiler blow-down is required.

Impurity concentrations in both boilers are recorded on one two-point Micromax recorder.

Miscellaneous Instruments

In addition there are other operating guides, besides those mentioned above, which include steam flow indicator recorder and integrator, water flow recorders and integrators, boiler water level recorders, draft indicators—showing air and gas pressures at numerous points from forced-draft fan discharge to induced-draft fan discharge, and pressure gauges for both boiler feedwater and steam.

On another panel for turbo-generator instruments only a Micromax multi-point temperature recorder prints a continuous record of generator temperatures. Temperatures of stator windings and of air in and air out are recorded.

Due to the close inter-relationship of our supply of both electricity and industrial steam the problem of load dispatching—both steam and electric quantities—assumes importance. To meet our needs a new system of steam flow telemetering was developed in co-operation with the Republic Flow Meters Company and the Leeds & Northrup Company. The instruments and details of the steam flow and other telemetering will be covered in a subsequent article in this magazine.

Maintaining Dealers' Sales Pace as Saturation Rises

[*Continued from page 34*]

many salesmen have been employed, their compensation has been too small, and the result has been price cutting and unjustifiable trade-ins. Most dealers find that a few well-paid, well-trained salesmen are profitable to the store, and those who intend to remain in business a long time have learned that appliance service departments are profitable from the sale of used equipment and development of prospects thereby.

For 1939 sales promotion we are exploring the possibilities of increasing our sales in towns where low use of energy prevails. It has been shown that in most instances there is very little dealer sales activity in these locations. In our effort to build kilowatt-hour use in towns below the company average we are increasing sales forces and inaugurating a four-year plan. It comprises these four points:

1. Salesmen and home service department to promote actively year-round use of present equipment.

2. To sell 5 per cent of the domestic customers electric water heaters each year.

3. To sell 8 per cent of the domestic customers electric ranges each year.

4. To sell 6 per cent of the customers now using less than 40 kw.-hr. per month additional lighting and a sufficient number of electric refrigerators and small appliances to increase their use by 25 kw.-hr. per month on the average.

Accomplishment of the program will involve careful analysis of customers and selective selling. Focal point in customer analysis is the amount of expenditure each customer makes for other comforts and conveniences. We do not expect more than a fair share of the customer's dollar, but our problem is to get that amount.

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Planning for Consumer Satisfaction

[*Continued from page 39*]

while decreasing fuse operations and transformer failures cuts expenses; these savings and income will more than pay for the surveys and records. One of your really great problems in planning supply and distributing systems is the determination of how far you are justified in increasing investment to improve service, and the chances are that you are paying for good quality electric service whether you are getting it or not. In the absence of a thorough knowledge of present deficiencies in electric quality, who is affected and how seriously; without the facts regarding the means available for improving service and their cost and effectiveness, you cannot hope to get full value out of your present investment.

The importance of great catastrophes is often exaggerated when no quantitative experience exists by which to judge them, causing much recrimination, and hasty expenditures of uncertain effect. Viewed against the setting of system performance over a number of years, however, a major outage assumes its true proportions, leading to the most effectual and efficient use of your facilities as a whole.

The extra cost of giving excellent service is only a small proportion of the total cost of serving at all. Poor voltage or frequent interruptions on any particular secondary or substation nullifies, as far as that specific location is concerned, all the expenditures made on the entire system to give good service. How far you are justified in going in order to improve service depends upon what quality your customers want and upon the economics of each situation. Your records should be established to show what parts of your system are most vulnerable and the efficacy of the various remedies. Weigh the cost against the expected improvement in service, considering each situation separately in descending order of importance and seriousness. You will reach the point of diminishing returns, where the proposals cease to be convincing[4] in the light of the consumers' desires.

Like the salesman who said he had made a lot of friends for his company that day (his companion replied that neither had he sold anything), this opus wishes only to create friendship for the idea of transferring more thought and emphasis to the quality of your electric service, so you may be moved to collect and utilize data concerning satisfactory voltage and dependability of supply. Specific procedures or particular forms for this purpose have purposely been omitted from this discussion. We have just started on the possibilities in this direction and there is plenty of unfinished business in analyzing system performance.

In the adolescence of the electrical industry it didn't matter so much if its clothes were oversize or didn't fit the same everywhere. Now that your business has reached manhood, its growth will be more selective; the golden age is over; excess capacity and second guesses aren't compatible with shrinking profit margins. Benner[5] suggests an interesting classification of system facilities as fixed and current assets, the latter being more mobile and better adapted to meet changing load characteristics.

Evaluating Reliability

The accent is shifting from construction standards to maintenance and operation schedules, bringing great opportunities for profitable activity by engineers and operating staffs. There are calls for devising a reliability index which is as simple as a load rating; life expectancies and mortality tables for electric property so that the depreciation charge —one of the largest single items in your operating statements—may be placed on a scientific basis; an actuarial approach to the risks and probabilities affecting your lines and apparatus, balancing the "premiums" —the cost of decreasing the problematical hazard—against the insurance from outages or damage; voltage and power factor surveys; load duration, overload probability, and peak percentage curves, system power flow and energy flow diagrams, evaluation of losses, all merit further attention.

Engineers are only beginning to exploit these promising employments; perhaps you cannot ever hope to fulfill the entire ambitious agenda —but "man's reach should exceed his grasp, else what's a heaven for?"

[4] S. M. Dean, "Considerations Involved in Making System Investments for Improved Service Reliability."

[5] P. E. Benner, "Economies in Distribution Systems Through New Methods and Equipment," April, 1938, *General Electric Review*.

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